THE AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY

Publishing Office, No. 42 Pine Street.

Devoted to the Interests of Illumination, Heating, Ventilation and Sanitary Improvement, Domestic Economy, and General Science.

VOLUME XIX.—No. 3.
Whole No. 339.

NEW YORK, SATURDAY, AUGUST 2, 1873.

$3 PER ANNUM
IN ADVANCE.

Improvement in Machinery for Elevating and Transporting Coal, and for the Charging and Discharging of Gas Retorts.

DESIGNED AND PATENTED BY T. F. ROWLAND, M. E.

In the manufacture of illuminating gas, little progress has been made since its first introduction, tending to greater facility in the manipulation of the materials and consequent reduction in the cost of producing it.

The primitive method of bringing the coal into the retort house in wagons or barrows operated by hand, and dumping it promiscuously on the floor, then at the proper intervals shoveling it into the retorts in the face of a heat so intense as to prevent the operatives depositing it in equal quantities and even layers, which obtained in the early history of gas making, is still in vogue with the greater portion of the gas works in the country, though some of the works of our larger cities have adopted the "long scoop" method of charging, which facilitates the work to some extent. This method consists of using scoops as long as the retorts, and of capacity sufficient to contain one-half of a "charge." Two scoops are brought into requisition at each time of charging, and having been filled (previous to the withdrawal of the coke) are manned by three operatives, when each scoop is in turn lifted to the mouth of the retort, thrust in, dumped, and then withdrawn, depositing the coal in a better condition than the shovelling process, but still, in a measure, leaving it in "hills and furrows." Of still greater importance is the disadvantage and loss which obtains from the accepted method of discharging the coke from the retorts. The coal having been unevenly deposited, necessarily involves an irregular distillation and loss, and often a serious "banking up" and choking of the coke in the retorts, entailing upon the operatives the most exhaustive labor in their efforts to withdraw the same with the hand-rakes, and requiring the retorts to be open so long as to greatly impair the heat.

This crude and unsatisfactory manner of prosecuting an industry of such vast importance to civilization (as the present means of producing artificial light), has recently attracted the attention of some of the best engineering talent of Great Britain, resulting in bringing forward a number of very ingenious machines, designed to accomplish in a much cheaper and more expeditious method, that service by steam power which has heretofore been entirely dependent upon manual labor, the introduction of which bids fair to materially reduce the cost of manipulation.

The inventions alluded to have mostly been confined to the charging of coal *into*, and the discharging of coke *out of* the retorts, and have not encompassed the proposition to transport the coal into the retort house and to distribute it in proper quantities into the "pocket" of one or more "charging machines," keeping up a continual supply, and from the said "pocket" of the "charging machine," automatically measuring out and delivering to each of the "charging scoops" in action a definite amount of material.

The desideratum is to produce machinery which shall automatically receive the coal outside of the retort house, or from the coal storage building, transport it to the pocket of the "charger," meter it into the "charging scoops," deposit it in given quantities evenly upon the floor of the retorts, and discharge the coke into the basement of the building, or into wagons provided for the purpose.

Plates No. 1 and 2 are perspective views of the machinery as it appears inside of the retort house.

Plates No. 3 and 4 are perspective views of the coal meter (detached from the charging and discharging machine), showing the "cam motion" for operating the inclined plane; and the gear for revolving the meter cylinder.

Plate No. 5 illustrates the charging portion of the apparatus, and plate No. 6 the discharging portion; both views being shown in perspective, detached from the main car or carriage, to expose the gearing through which the power is applied to cause them to travel.

Plate No. 7 is a mechanical drawing, representing the entire machinery.

Fig. No. 1 being a longitudinal vertical section through the retort house.

Fig. No. 2 is a transverse vertical section of the same, and Fig. No. 3 a plan of the "pendant railway" (each view being broken and partially shortened, to save room).

The portion of the apparatus designed for the transportation of the coal into the retort house, and the delivery of it into the pocket of the charging machine, and which for the want of a better title, may be called the "Pendant Railway Coal Carrier," (see plate No. 7), consists of an endless rail or track, secured underneath and to the tie-rods of the roof frame of the retort house, or to transverse beams, mounted on columns provided for the purpose. This rail forms two lines of way (parallel one with the other) ten feet asunder, the ends of which are connected by semi-circles five feet radius.

This system of rail extends the entire length of the retort house, and is continued out beyond the buildings, terminating within a tower, located at the coal storage buildings, or other convenient locality, and provided (for the purpose of raising the coal to a suitable height) with means for elevating by the ordinary "bucket and belt" apparatus, and depositing it in a pocket at its top.

Within this tower is located a horizontal drum, ten feet diameter, and about three feet face, a similar drum being located within the retort house, at the opposite end of the railway.

These drums are of two distinctive characters, the one within the tower being caused to revolve by a suitable steam engine, performs the double duty of causing the belts, with their attachments of pendant buckets, carriages, etc., to travel, and affords an effective means by which the buckets are successively filled with coal. The drum at the opposite end of the railway being simply an idler, transmits and gives a return direction to the belt, to which at stated intervals the pendant buckets are attached.

The buckets are supported vertically, by being attached to suitable carriages, or suspended from them, the carriages travelling on the "pendant railway" before described.

The distance asunder at which the buckets are attached to the belts, is equivalent to the semi-circumference of the drum. Thus when the drum revolves, one bucket comes in contact with its periphery at the moment of time the preceding bucket leaves the same.

* * * * * * * * *

The drum is provided with diagonal chutes (one opposite the other), leading from a common center above the drum, to openings in its periphery. The apex of these chutes is cylindrical in form, into which the spout of the upper receiving pocket terminates.

Each diagonal chute is provided with two semi-circular "shut-off" valves, the edges of which are armed with steel blades, to shear any coal which might otherwise tend to clog their action. * * * *

The portion of the bucket which carries the coal is cylindrical in form, and the plane of its travel is below the face of the drum. Attached to the top of the cylindrical part, is a portion of the bucket of "half cylindrical" form, the plane of whose travel is directly in line with the plane of the drum. This portion of the bucket is open upon its face, and when in contact with the drum, covers the chute opening therein, and forms a close connection for the coal to travel to the buckets.

The machine for charging the retorts (to be hereafter described) is provided with a "coal pocket" to receive the coal from the "pendant buckets." There is a "tripper" mounted on the edge of this "pocket," which coming in contact with the trip-latch of the "pendant buckets," as they traverse the building, *releases* the bottoms of said buckets as they arrive over the "pocket," allowing the coal to fall therein.

When the "pocket" is full, the tripper is thrown from gear, allowing the buckets to pass untripped until they arrive over the pocket of a second charging machine (should the number of retorts in service be large enough to require two). If no coal is required by either charging machine for an interval of time, the buckets will pass on round the "idler," and return into the tower, where, coming in contact with a fixed "tripper," their load is deposited in a chute, leading to a pocket at the foot of the elevator.

At a suitable point within the tower, and on a line with the buckets is a wheel, which, after the bucket has passed the chute alluded to, comes in contact with

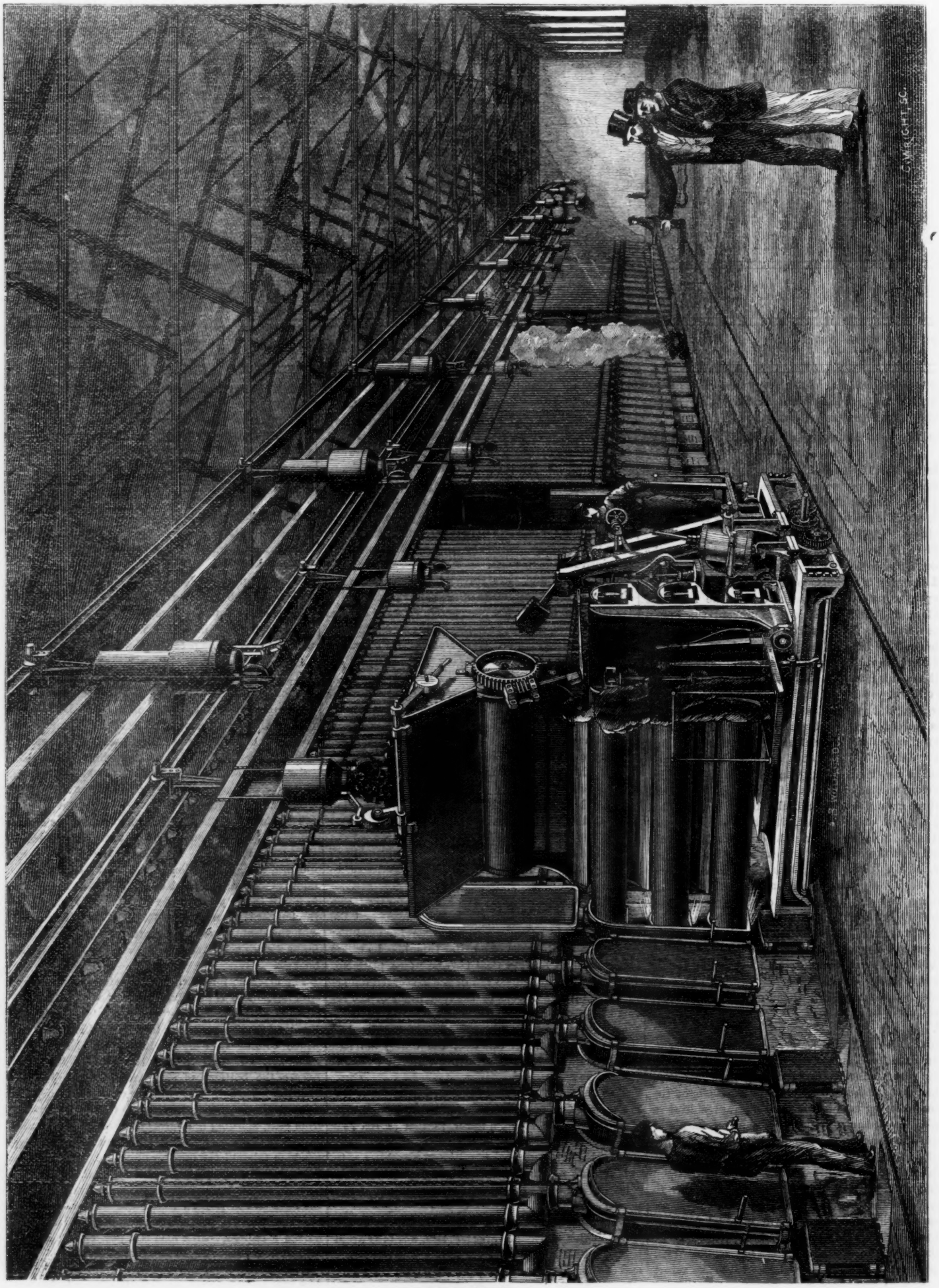
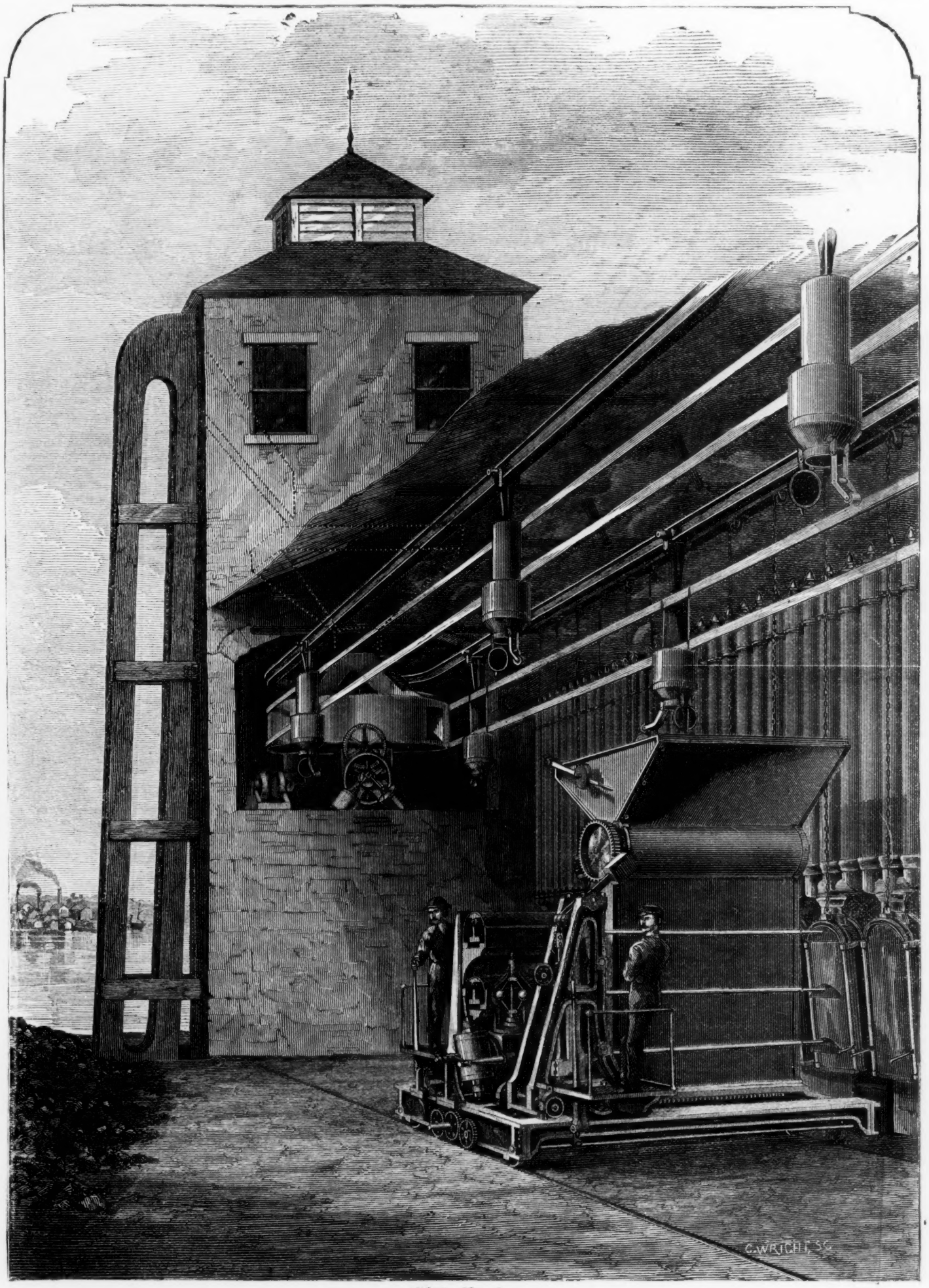


Plate No. 1.



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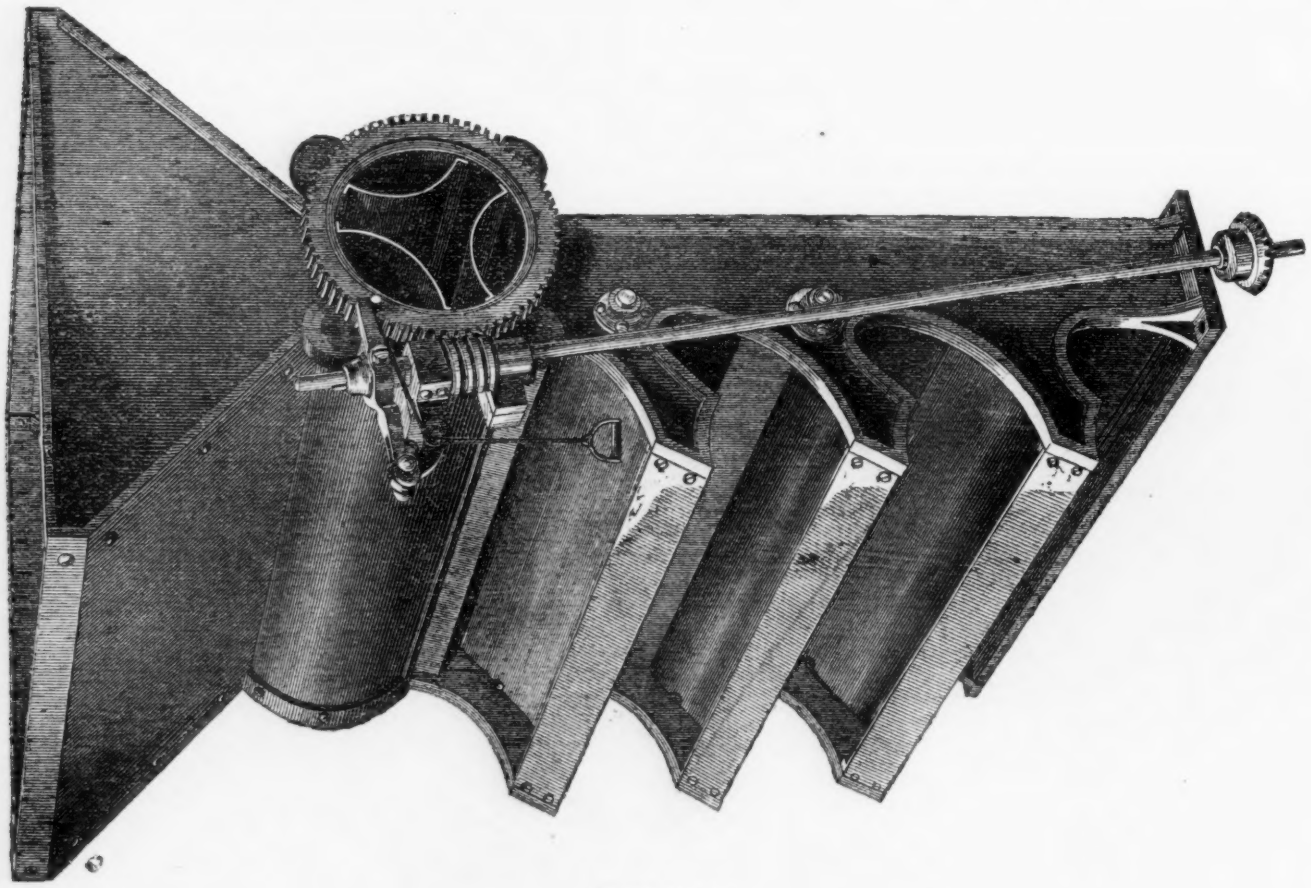

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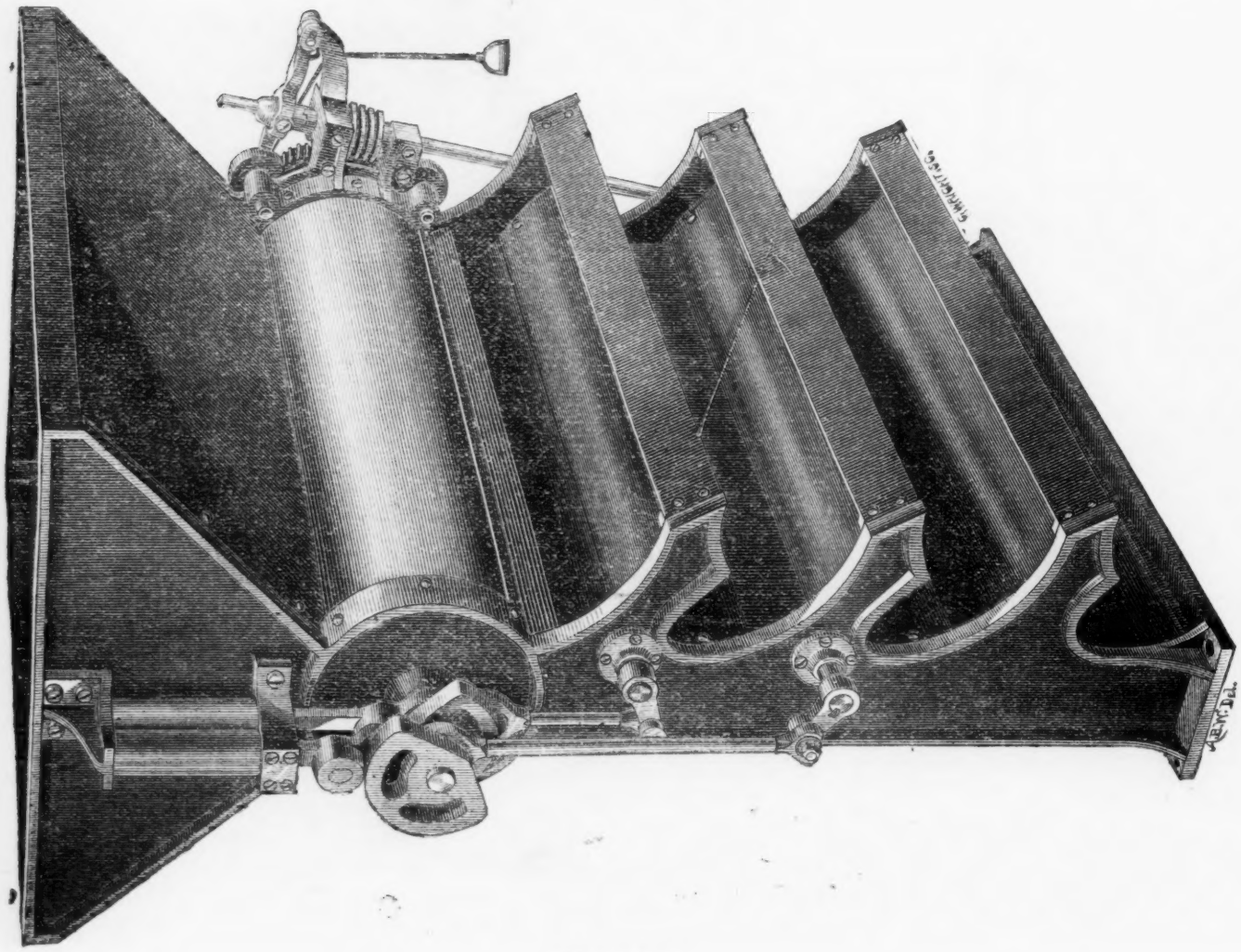

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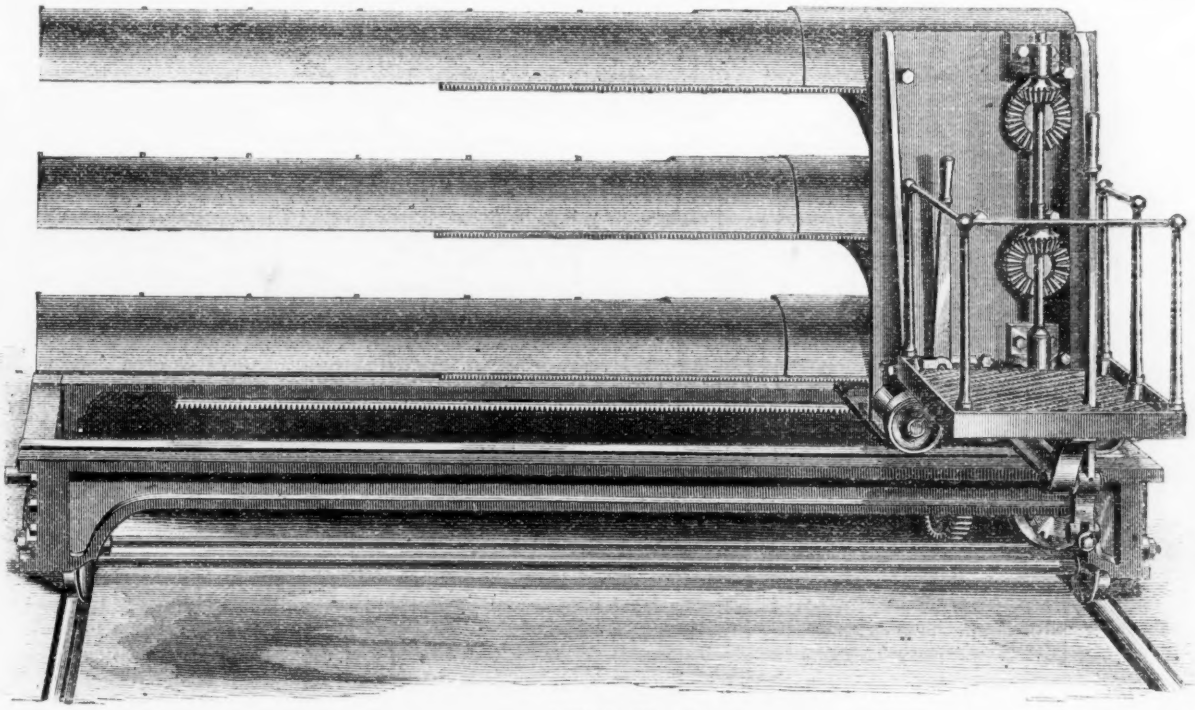

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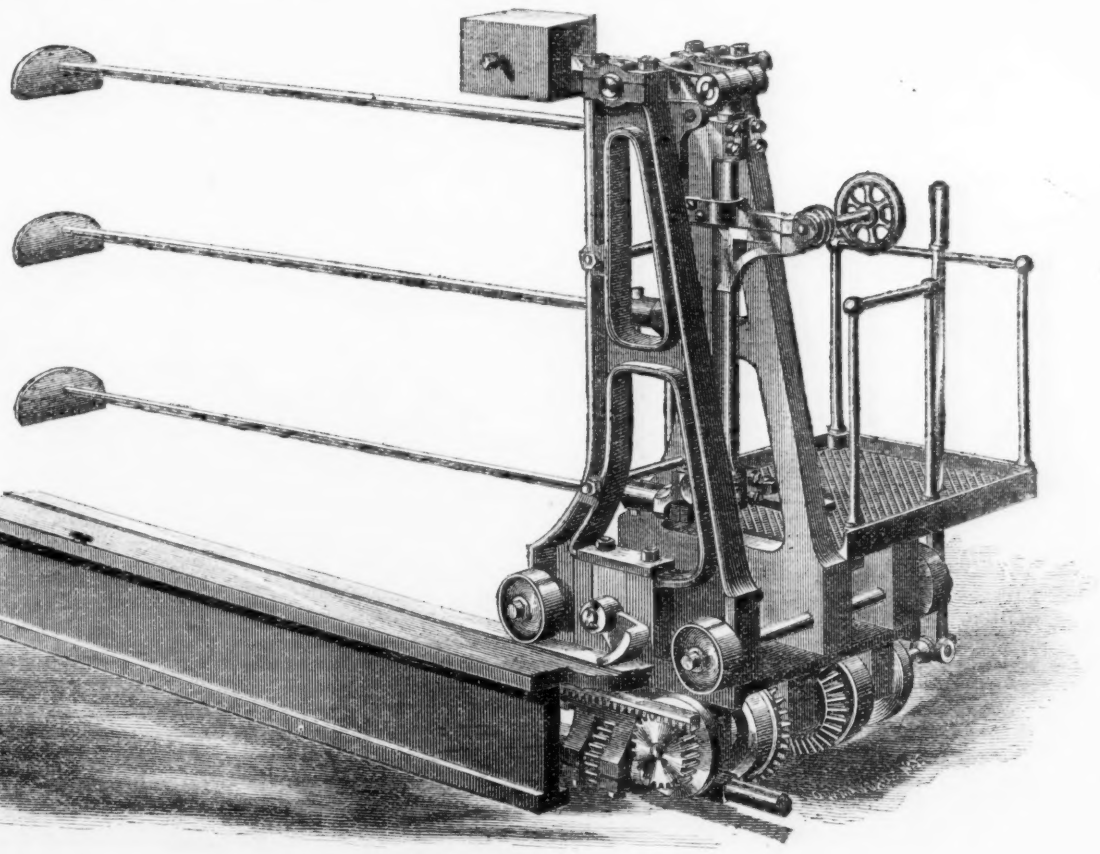

Plate No. 6.

the bucket bottom, causing the same to close and and latch, leaving it in a condition to be again loaded with coal. The capacity of these "pendant buckets" is about three hundred pounds each, and they may be made to travel with a velocity of one hundred feet per minute.

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The mechanism for charging the coal into and drawing the coke from the retorts consists of a carriage, arranged to traverse from end to end of the retort house, in front of the "benches," upon tracks secured to the floor for that purpose. Upon this carriage rests the "*coal metre.*" This portion of the apparatus consists of a "coal pocket," directly underneath which is a horizontal cylinder, arranged to revolve, having chambers within, corresponding to the number of retorts the machine is designed to charge at one operation. There are openings in each division of the revolving cylinder, communicating in turn with an opening in the bottom of the "coal pocket," and as the cylinder revolves, each division is in turn filled with coal.

The edges of the openings, both of the cylinder and "coal pocket," are armed with steel blades, which act as shears, to cut away any coal which might otherwise tend to clog the revolving cylinder.

When the cylinder revolves a certain part of its circumference, the coal deposited in the first division finds an outlet, and is dumped on an inclined plane, which leads directly to the top scoop of the "*charger.*"

* * * * * * * * *

The charging portion of the apparatus consists of a supplementary carriage, mounted on wheels, which traverses the top of the main car or carriage, at right angles to the line on which said main car travels.

This carriage is provided with scoops, placed one above the other, at distances corresponding to the vertical measure between the retorts.

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That portion of the apparatus which is designed for drawing the coke from the retorts, consists of a supplementary carriage arranged to travel in a similar

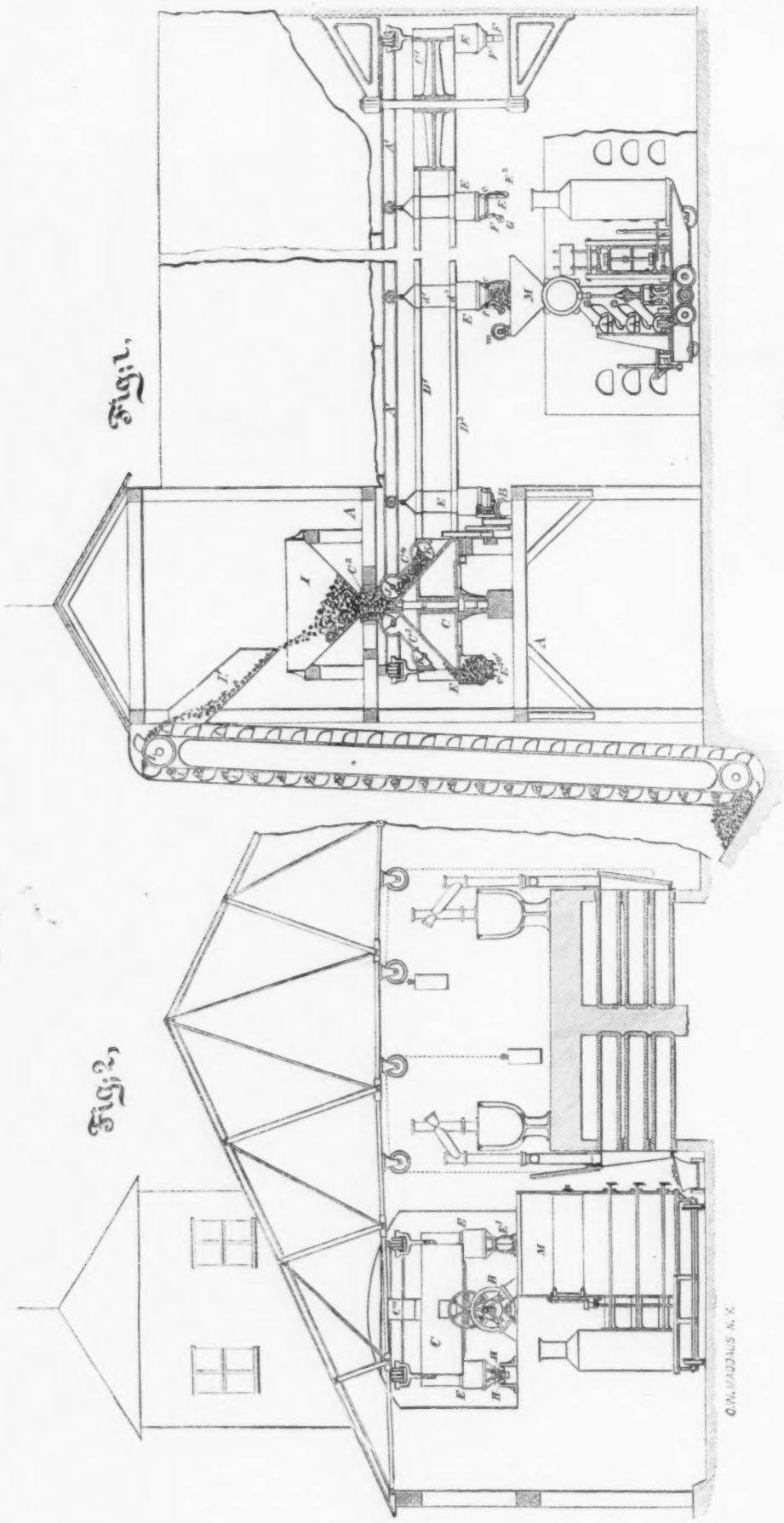


Fig. 1.

Fig. 2.

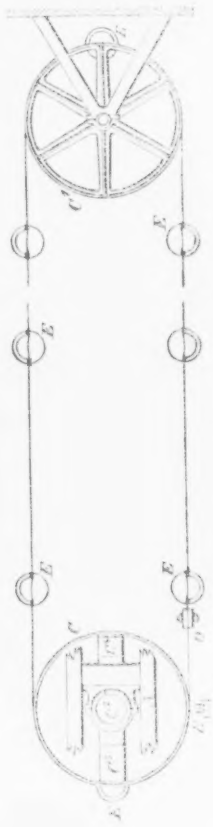


Fig. 3.

Plate No. 7.

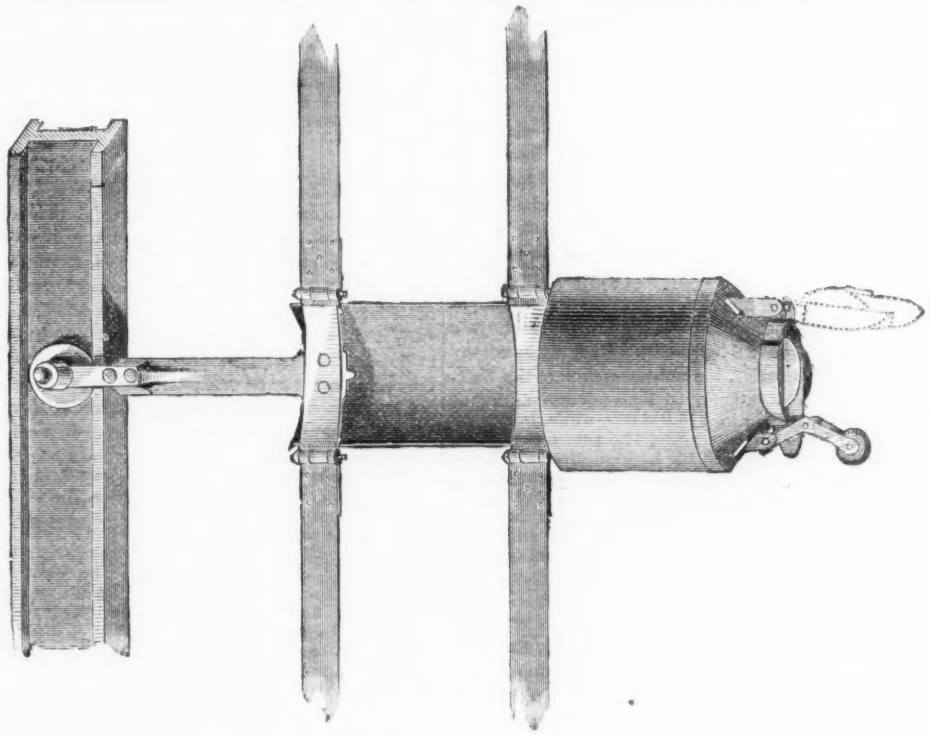
Key to the Indices—Plate No. 7.

A denotes the Tower.		F denotes the Bucket Bottom Latch.	
A1 "	Pendant Railway.	H "	Closing Cam.
B "	Steam Engine.	I "	Stationary Coal Pocket.
C "	Feeding Drum.	J & K "	Semi-Circular Slutes or Valves.
C1 "	Idler "	L "	Elevator Driving Wheel.
C3 "	Feeding Drum Slutes.	L1 "	Elevator Shute.
D "	Bucket Belts.	M "	Receiving Coal Pocket or Meter.
E "	Pendant Buckets.		

manner to that before described. Upon this carriage is mounted a suitable frame provided with "pillow blocks', at its top and also near its base. Thnse "pillow blocks" support horizontal shafts (in vertical line one above the other), and attached to these shafts are levers of equal length. The levers have attached to them a "standard" to which is secured the "rakes" or "coke hoes." * * * * * * * * * * * * * * * *

The rakes are arranged to move laterally, to compensate for any difference in the longitudinal distance between any two tiers of retorts, and also to enable the operative in charge of the machine, to encompass the entire surface of the "retort floor," and thoroughly remove the coke therefrom. They may be adjusted to draw from the middle line, or either side of the retorts, while they are in action, by simply moving the hand wheel, which controls the radius bar, projecting from the "standard."

The platforms, upon which the operatives stand to manipulate the machine, are secured to the supple-



ENLARGED VIEW OF PENDANT COAL BUCKET.

Plate No. 8.

mentary carriages and travel with them. Plate No. 6 illustrates the "raking" apparatus (described above), detached from the main carriage, for the purpose of exposing the underneath gearing which conveys the power, to cause it to travel.

The motive power for operating the "meter," or "charging scoops," and "coke discharging apparatus," is obtained from a pair of oscillating cylinder engines, mounted on the main car.

These engines are also arranged to be geared to the car wheels for the purpose of moving the machine from "bench" to "bench." Steam is obtained for the engines from a portable boiler (not shown in the illustrations), mounted on a pair of wheels, and caused to travel with the machine by being coupled with it. The steam and exhaust connections between the engine and boiler are made flexible, to admit of the variations in distance and level which will obtain between the two.

Economy of Coal.

At a recent meeting, Sir William Armstrong, C. B., delivered his inaugural address as President of the North of England Institute of Mining and Mechanical Engineers, in the Wood Memorial Hall in Newcastle-on-Tyne. He, in speaking of coal in an economic as well as in a technical point of view, observed that our consumption of coal had been increasing at a rate which could not possibly last, for if the increase at 4 per cent. per annum, computed in the manner of compound interest, went on, we should soon arrive at impossible quantities. If nothing else arrested it, however, a failure of mining labor was inevitably tending to have that effect; and but a few years would probably have elapsed before the number of hands became inadequate to meet the required demand, had not the miners precipitated the event by restricting the hours of work. The work at the face of the coal now only amounted to thirty-three hours per week, and that in the case of the steadiest men; the average being considerably below that limit. The men worked hard, even harder than formerly, while at their post; but, with the reduced working time, the output must necessarily be lower. The point had been reached at which the demand had overtaken the supply; though at the present increase of four per cent. per annum, a small addition to the present output would maintain the equilibrium.

The annual loss to the community, owing to the additional cost of fuel (exclusive of exportation) amounted to forty-four millions sterling, a sum which, if added to the existing taxation, would be considered utterly ruinous; and yet we were paying the equivalent of such a tax, with this difference, that the money did not go into the coffers of the nation. Coal owners had long been aware that limitation of quantity was the only effectual mode of raising price, but they had never been able, by their own action, to maintain a restricted production. At last their workmen had done it for them, and we saw the result. Whether the trade of the country would bear up against the heavy burden of dear coal, combined as it was, with dearness of other products, was a question on which he should not attempt to prophesy. It was in vain to appeal for relief either to the coal-owners or coal-workers; self-interest was the ruling principle of trade, and it was visionary to expect that men would sell either their labor or the produce of labor for less than the market value. Speaking, then, as one of the public, and not as a coal-owner, he said they must strive to economize the use of coal.

Speaking as President of an Institution of Mining and Mechanical Engineers, he said they must endeavor to make up for the deficiency of human labor by a more extended use of mechanical labor. Mr. Armstrong then considered how coal might be economized. The waste in domestic use and in steam engines was simply shameful, and in ironmaking and other manufacturing processes it was considerable. By a simple and unobjectionable departure from the conventional fireplace—by advancing it a little into the room and constructing it with proper heating surfaces, as in many stoves now in use, a saving of domestic fuel to the extent of one half might be attained. In steam-engines, at best, not more than one-tenth of the theoretic effect of the fuel was realized. In the Elswick Works his firm had erected two Corliss engines (to do the work previously performed by 10 smaller engines), with boilers of the best construction, and one of these engines was now using 24 tons of coal per week, against 60 tons used by the engines it had superseded. The general result was that the number of firemen was much diminished, and, notwithstanding the enormous rise in the price of coal, the required steam power was now obtained at a less cost than before, after allowing for interest on the capital expended. Having referred to other appliances for economizing coal in locomotive and marine engines, the President remarked that, speaking generally of coal consumption in all its branches, there could be little doubt that, without carrying economy to its extreme limits, all the effects we now realized from coal could be attained with half the quantity in use. If a reduction to that or approximate extent were effected, we should hear nothing more of scarcity or prohibitive prices for many years to come.

Speaking of the increased value of labor in manufacturing and mining enterprises, Mr. Armstrong contemplated the possibility of rural labor being so diminished in supply and increased in cost that, unless the growing cost of agricultural labor and horse-work could be counterpoised by a more extensive use of steam power, they might expect much of the land in this country to be thrown out of cultivation.

In conclusion, he referred to the results arrived at by the late Royal Commission as to the extent of our available coal and its probable duration. It was assumed that coal could be worked to the depth of 4000 feet, and if so, 146,480,000 tons of coal might be made available. At the present rate of consumption, that supply would last 1273 years; but increasing at the rate it had done for the last fifteen years, it would be exhausted in 110 years. The truth probably lay between these two extremes. Vast quantities of the coal, however, could never be worked except at a price which would render it more advantageous to purchase coal from abroad. He thought they would look in vain for cheaper labor to enable them to work the less valuable coal, and the one hope for the continuance of our prosperity, as dependent on our coal, rested on the skill and perseverance of mining and mechanical engineers.—*Mining World.*

On Coal Tar and Coal Tar Pitch.

Behrens.—On submitting to complete distillation on a large scale, the following products were obtained:

Oils containing anthracene, Oils containing chrysene and pyrene, Resinous matter (sublimed)	27–30	per cent.
Gas, water, and light oil	25–18	"
Coke	48–52	"
	100	100

The coke obtained in this operation varies in its nature with the temperature at which it is heated and the length of time the heating is sustained. To prepare a hard coke, the temperature must be raised towards the last to a bright red heat and continued at least eight hours; the whole operation requiring twenty-four hours. Experiments, made in English iron works to test the metallurgical value of this coke, furnished unsatisfactory results in cupola furnaces, but it proved to be well adapted to the refining of cast iron.

When coal-tar pitch is conducted through a red hot tube, it is decomposed, one kilogramme furnishing on an average 250 litres of gas; a photometric examination of this gas showed that it was of practically no value for illumination. It consists chiefly of hydrogen and contains sulphur.

The principal technical application or use of coal-tar pitch is the manufacture of "*Briquettes*," lumps of coal made by mixing coal dust with pitch, and pressing into a form. The importance of this industry may be estimated from the fact that a single firm makes 160,000 kilogrammes in twelve hours, having an invested capital of 600,000 francs.

Another interesting industrial application of coal-tar is the manufacture of the so called *asphalt-tubes*. They were invented by Jaloureau in Paris, and serve to conduct cold liquids and gases. They possess the the advantage of being very cheap; they withstand a pressure of 500 lbs. to the square inch; are somewhat elastic; are impermeable to water: are poor conductors of heat, and are not attacked by weak acids or alkalies. They are serviceable for subterranean telegraph lines, speaking tubes, and gas mains. Coal-tar pavements, roofing paper, and artificial stone are too well-known to require further notice.—*American Chemist.*

A fire-proof stove for use in passenger cars especially, was subjected to a severe test in Boston, recently. The stove is made of wrought and malleable iron. It is circular in form, composed of three upright cylinders and two cold air boxes at the bottom. The fuel is placed in the inner cylinder. The cold air rushing through the cold air boxes drives hot air outward and upward through the cylinders. the rounded form giving a very powerful radiation. The heat escapes through a register in the back. The whole is firmly bound together by strong iron bolts. The doors are fastened by patent locks. At the trial the stove, after the fire in it was well under way, was thrown from the staging upon which it was placed, to the ground, a distance of six feet. It was then rolled about, tumbled over and over, but not a spark of the fire was spilled upon the shavings which were scattered around. When the stove door was opened the fire was burning briskly. This ingenious apparatus was invented and manufactured in Wilmingtan, Del. —*Railroad and Mining Register.*

Chemical Repertory.

No. 96.—August 2, 1873.

EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

808. Poisoning by External Application of Carbolic Acid.—A case occurring at Wurtemberg is reported in the *Pharm. Journ. and Trans.*: A physician prescribed thirty grains of acid to be mixed with alcohol and water, and rubbed briskly upon the skin of two patients suffering from itch. As a result, one of the patients died within an hour, and the other narrowly escaped with his life.

809. Extraordinary Explosion of Gas at Elderslie.—At a late hour on Sunday evening, May 18, a youth named Gault, who lives at Elderslie, near Johnstone (England) met with a remarkable accident. Seating himself on a kerbstone in the village street, he struck a match, and after lighting his pipe, pitched the match into the sewer at his feet. The result was that a violent explosion of gas, which had generated in the drains, took place. The grating was torn off, thrown to a considerable distance, and the boy tossed into the air. His face and hands are burnt, but the other injuries are not serious.—*London Journ. of Gas-Lighting.*

810. Can It Be?—In a report on the mechanical inventions shown at the International Exhibition, *apropos* of the sand blast, the Rev. A. Rigg suggests that there may be a property in water which has not yet been utilised. While standing, he says, "near a new steam-boiler, which was being tested under water pressure, and when the load was near its maximum, a small and (except that the sun shone upon it so that the light was decomposed) imperceptible jet appeared; the writer was about to pass his finger across it, when a workman said, 'Don't do that, sir; a boy had his finger cut off with one of those jets.' Might not a jet of water be used as a saw.—*Iron.*

811. To Fasten Leather upon Metal.—F. Sieburger recommends the process proposed by the late Prof. Fuchs:

One part of crushed nutgalls is digested six hours with eight p. distilled water, and strained. Glue is macerated in own weight of water for twenty-four hours, and then dissolved. The warm infusion of galls is spread upon the leather, the glue solution upon the roughened surface of the warm metal, the moist leather is pressed upon it and then dried, when it adheres so that it cannot be removed without tearing.—*Polyt. Notizbl.*

812. New Infernal Machine.—*Iron says:* The statements concerning the manufacture of "Marine Infernal Machines," which at first sight appeared romantic, seem to be assuming a hideous appearance of truth. There is something inexpressibly awful in the idea of a stately argosy sailing majestically over summer seas, while the "small invention called a rat" is slowly and silently but surely gnawing a hole in the frail plank of wood or iron which separates life from death. The letter of an "Ex-Yachtsman," in the *Times*, has about it a dreadful circumstantiality. We only hope that, as that gentleman remarks, "the mystery will soon be solved." Once discovered and published to the world, these murderous engines must be abandoned by their infamous constructors, therefore the sooner the whole of the particulars are made public the better.

813. A Revolution Foreshadowed.—It is interesting to note the gradual recognition in England of the fact that ere long the tide in the iron manufacture must set in the opposite direction. In the words of Mr. Bell:

"If, then, we have to apprehend the advent of a powerful rival in the iron trade, it is not, unless new coal discoveries are made, the old world of Europe we have to fear, but the immense and undoubted powers possessed by the Western hemisphere. In ores of the finest descriptions, the resources of the United States are unlimited, while in coal our own wealth is, in comparison, poverty. In the matter of skill, every one who has had the opportunity of inspecting the American iron works concurs in reporting that their development is quite in keeping with the advantages Nature has conferred upon that highly favored country.—*Am. Exch. and Review.*

Death on the Road.—*Iron* says: He who, like Dr. Johnson, prefers a walk down Fleet Street to a stroll in the country, and loves the sound of Bow Bells or Big Ben better than the chime of an ivy-clad village church, will hear, with dismay, that a walk in the streets of London is one of the most dangerous of all expeditions. Compared with the peripatetic philosopher who loves to moralise in the crowded thoroughfares of the great city, the railway-traveller enjoys a safe and untroubled existence. Deducting railway servants and suicides, the railway system of the United Kingdom costs about 900 lives per annum, out of a passenger traffic of 375,000,000, while, taking an average of the last four years, 122 persons are killed annually by accidents in the London streets. When the "blocking and interlocking" systems are carried out in their integrity a railway carriage will almost justify the eulogium of Mr. Bright as one of the safest places in the country, and will rival the cabin of a Cunard boat, described by an old commercial traveller as the safest place in the world.

815. Test for Sewage in Water.—At a recent meeting of the Royal Dublin Society, Dr. Reynolds called attention to Heisch's test for detecting sewage contamination. It is one of the best known, but has been strangely neglected. About half a pint of the water to be examined should be placed in a colorless, glass-stoppered bottle, and a few grains of the best loaf sugar added. The bottle should then be placed in a position where it will be directly exposed to the rays of the sun. The liquid should not become turbid even a week or ten days' exposure. If there is a perceptible cloudiness, sewage contamination may be strongly suspected. Frankland has stated that this turbidity is due to phosphoric acid present in sewage, and it has also been suggested that it is due to fungoid growths.—*Journ. of Applied Chem.*

816. Exhaustion of the Belgian Coal.—The importation of German coal has not only commenced in England, but now even in Belgium, and in the valley of Liege, so full of coal mines, the importation of the cheaper German coal, for the use of the many industrial establishments in operation there, has produced great excitement among the population. Belgium has been coveted by France, as being much richer in coal, iron, zinc, etc., than France, in all of which that country is rather deficient for its size: but now to hear that even Belgium, formerly so rich in this mineral, cannot produce coal at the price it is imported from Germany, is rather alarming. It proves that, with the continually increasing depth of the mines, the expenses of mining have increased there considerably as well as in England. In the basin of Charleroi, Belgium, the coal is becoming more and more scarce, and now costs at the mine $5 in gold, while blacksmith coal costs $8 in gold per ton. In France the importation of German coal, which has been carried on for a long time, is slowly increasing.—*Coal and Iron Record.*

817. Copper and Brass Gas-Fittings.—Acetylene is one of the constituents of coal-gas, and it would be well for the consumers if it existed therein in large quantity, and with more regularity. It has, however, certain disadvantages, if brass or copper pipes are used for the passage of the gas containing it. Such pipes are readily attacked by acetylene, and become speedily covered with a black deposit of cupro-acetylene. This compound explodes with great violence when it is heated. Lead and iron are unaffected, so that it may be conceived that the humble iron and pewter pipes commonly used have a decided advantage over their handsomer brethren, copper and bronze: and it is, perhaps, fortunate that the economy of the gas-fitter has prompted him to use lacquer so plentifully, and brass-plated castings so profusely, or long ere this time most serious accidents must have happened. In those cases, however, where the fitter has really used the more expensive metals, the danger may exist, and go on increasing without exciting apprehension, since it is only when a very serious stoppage occurs that such pipes are examined. This compound (cupro-acetylene) is, however, readily decomposed by hydrochloric acid. By occasionally filling such pipes, therefore, with this acid, and subsequently washing them out with water, the danger accruing from the long-continued passage of coal gas may be obviated. A better plan still is to substitute lead, iron, or pewter pipes for the copper ones now in use.—*Iron.*

818. How Fast Can a Wheel Be Made to Revolve.—The only limit to the number of revolutions which a wheel may be made to make in a given time is the tensile strength of the materials of which the wheel is made, and its consequent power to resist the centrifugal force which tends to rend it asunder. Savart, in his experiments on the theory of accoustics made wheels to revolve from one thousand to two thousand times per minute: but this has been surpassed by Foucault, who invented an apparatus for measuring the velocity of light, to which a small wheel with a mirror was attached, which might be made to revolve 600, 800, and even 1,000 per second, or 60,000 times per minute. At these velocities, the ordinary amalgam was completely stripped from the glass to which it was attached; and it was found necessary to use mirrors either of glass coated with pure silver, or made entirely of metal. These are the most rapid revolutions thus far obtained that we are aware of: but there is not the slightest reason why even this should not be surpassed. It is evident that for such great velocities, cog-wheels are out of the question. Only bands or strings can be used.—*Coal and Iron Record.*

819. Gas-Explosion at Manchester (England).—The accident was a very sad but a very ordinary one. It is clear to us that the man Eachus, perhaps laudably desirous not to waste more gas than was absolutely necessary, neglected to pass it a sufficiently long time through the "syphon pot" to displace all the air it contained. To completely dislodge the air from a vessel of the dimensions of this pot would require gas to be passed from a 1¼ inch pipe for several minutes. The joints on trial were found to be sound; but as soon as the gas pipe was disconnected, a light being close by, the explosive mixture in the pot was fired, with the disastrous results reported. The accident is greatly to be deplored, but it is illustrative of no new danger to inquisitive people in the streets. Care will be taken by the engineers of the Corporation of Manchester that the joints of syphon pots are for the future tested in a different way, and the matter will soon be forgotten by all but the friends of the two persons unhappily killed. Such explosions never occur spontaneously.—*London Journal of Gas-Lighting.*

820. Saffranine.—This interesting dye has been lately investigated by Hoffman and Geiger. The sample upon which they operated was obtained from the establishment of Tillman, at Crefeld. It is sometimes sold as a solid paste, and sometimes as a yellowish red powder, containing the chloride of a colorable base in addition to carbonate of lime and chloride of calcium. The true color is extracted by boiling the paste and filtering the solution when hot. On cooling it deposits a crystalline matter which after repeated re-crystallization leaves no fixed residue. With each solution it becomes less perfectly crystalline and loses chlorine. The addition of hydrochloric acid restores the form, and is necessary to obtain normal salts. The chloride of saffranine is soluble in water and alcohol, especially when hot, but insoluble in ether and in saline solutions. The solutions are of a deep orange, and strongly fluorescent. Its composition was found:

Carbon	68.82
Hydrogen	6.09
Nitrogen	15.34
Chlorine	10.23
	100.48

Saffranine cannot be obtained as a free base by precipitation with alkalies, as it is re-dissolved on diluting with water. It is best prepared by treating its chloride with the oxide of silver; it is thus obtained as an orange liquid, giving on concentration reddish-brown crystals. When dried at 212° they have a green metallic lustre. They dissolve in water and alcohol, but not in ether. On adding strong hydrochloric or sulphuric acid to the solutions of its salts, the red brown color of the liquid changes to a fine violet, which on

adding more acid changes to a deep blue, then to a deep green, and lastly to a light green. Anilines of a high boiling point are best adapted for its preparation. It may be obtained by treating them with a mixture of nitrous and arsenic acids, but the yield is small. The best results were obtained by the authors with chromic acid acting upon a liquid toluidine at 198°.—*Iron.*

British Association of Gas Managers.

TENTH ANNUAL MEETING, JUNE 11.

[We find in *Iron* the following condensed account of the proceedings of this body. The first day's session was occupied by the address of the President, Angus Croll, Esq., A. I. C. E. The substance of this we shall endeavor to give hereafter, as well as that of the more important papers read.—ED.]

The business of the second day's sitting of this Association of the Edinburgh meeting, which was last week, was resumed by Mr. T. H. Methven, of Bury, St. Edmunds, with a paper on "Coals wasted in Gas Works." His remarks were chiefly intended for the consideration of gas directors and managers in towns of 6000 inhabitants and under. To such persons the subject was especially important, for, unless they gave attention to it, there would be no dividend or they might have to make an additional charge to the consumer of 1s. or 1s. 6d. per 1000 cubic feet. In such towns, with 15s. per ton, and gas at 5s. 6d. per 1000 cubic feet, there was no difficulty in paying the usual dividend of 5 or 6 per cent. The author considered that, instead of the yield of gas being gene rally about 5,500 or 6000 feet per ton of coal carbonized, it ought to be from 7000 to 8000 feet, and that there was great room for improvement. He gave a number of sample balance-sheets in illustration of his remarks; and he said that there were in England and Wales 388 towns, having each a population of about 6000, consuming annually, in the aggregate, 144,000 tons of coal in gas-making. If only 5500 feet of gas out of 7,500 feet were sold, it followed that 44,000 tons of coals were wasted. The causes of the mismanagement leading to the waste were—

1. Badly set and worked retorts.
2. Clay retorts with insufficient attention.
3. The want of a station meter, or neglect to use it.
4. Neglect to weigh or measure the coals.
5. The want of, or neglect to use, a governor.
6. Badly-laid mains or service pipes.
7. Unsuitable burners and arrangements for the public lamps.

If gas directors wished to be paid for 7,500 feet per ton of coal carbonized, they must attend to the whole of these matters or obtain some one who can do it.

A brief discussion ensued.

Mr. F. W. Hartley, of London, followed with a paper on "Coal Gas as Fuel." In it he drew a direct comparison between the cost of gas, and solid fuel or coal, as a heating agent for steam boilers, showing the great economy of coal on the large scale. He then made a similar comparison in respect to cooking on a large scale, principally in respect to boiling or steaming food. Nine degrees waste of heat was shown to arise from the use of gas for merely boiling, as compared with steaming. Some consideration was given to the use of gas in an open fire, as compared with coal in an open fire, for boiling and roasting, and the author advocated the use of gas for roasting and baking under almost all circumstances. He then entered upon the mode of employing gas stoves in heating, dividing them into simple cylinders, and multiple cylinders, tubular stoves, reflector stoves, and stoves with solid heating materials. He advised the use of the latter in conjunction with a large radiating or conducting service, and he insisted upon the ventilation of all heating stoves as indispensable, and concluded by showing the advantage of gas, in spite of its cost, for heating conservatories and similar places.

Mr. Sugg, of London, and several other members, entered into a discussion on the subjects raised by Mr. Hartley's paper, and the general opinion was, that it was quite possible to heat a room, by means of gas, for 5d. a day. The chief difficulty was in getting quit of the contaminating atmosphere, which, of course, might be overcome by means of flues, etc.

A paper by Mr. T. A. Skelton, of London, on "Gas Street Lighting," was afterwards read. It first treated of the various forms of street lamps used from the commencement of gas lighting in London, in 1807; and afterwards, the introduction of such improvements as argand burners, glass chimneys, dioptric refractors, and parabolic reflectors. The author then exhibited and described his catoptric lamp, several of which stand in front of the General Post Office, and Register House, Edinburgh. The angles at which the reflecting plates were placed were such, that while they intercepted light radiating upwards through 50° of arc, they concentrate it within an arc of 15°. That gave sufficient dispersion of the reflected light over the dark intervals between the lamps in a street, and by varying the angles of the reflectors the direction of the reflected light was brought under perfect control. To this kind of lamp Mr. Skelton fixed a regulator, which allowed a flame to burn at the rate of four feet of gas per hour only. He also noticed the method of lighting by the rod, and an improved method of closing the bottom of the lamp.

Mr. Sugg sketched on a black board his Westchester lamp, which had two ventilators at the top perforated with small holes, through which the heated air might pass. At the bottom a lever might be pushed in by the lighting rod, in order to light the gas at the burner. It was stated that this lamp had been put up on Hyde Pier with the best results, for during the terrific gales of last winter the lamps on the pier had not been extinguished, while the lamps in the town (which were not on the Westminster Bridge plan) had been almost all blown out.

Mr. J. R. Frith, of Runcorn, read a paper on "A Plain System of Bookkeeping by Double Entries specially adapted for Gas Companies." He explained the system of double entry, which he described as one which is sometimes thought to involve double labor as well, but asserted that what was worth doing was worth doing well, and that in reality, especially where the manager acts as engineer, secretary, and other officer as well, the system he advocated was in the end far less troublesome, and infinitely more correct and satisfactory, than any modification or extension of the single entry plan. He expressed surprise at hearing of a company with £370,000 of capital working without a cash book, and stated that the imperfections or absence of system in the keeping of books and gas companies' accounts that had come under his notice had induced him to lay before his brother managers what he considered to be a concise and simple plan.

Mr. James Randall, of Tottenham, also read a short paper on "Computation of Gas Accounts, arising from the Non-registration of Gas Meters."

In the absence of the author (Mr. Henry Gore, of London), the secretary read a paper on "Substitutes for Coal in the Manufacture of Illuminating Gas," which treated of the use of oils, resins, wood, mineral pitch, the decomposition of steam and the subsequent carburation of the inflammable gas obtained, and the carburetting of atmospheric air. The author reviewed the different kinds of apparatus and processes employed, and gave the results of his experience and observation in many towns on the continent of Europe and in America, the conclusion which he had come to being that there was no material or process superior to those generally employed in this country. His paper included a very elaborate report which he had submitted on this subject to the London New Gas Company (Limited), and in which he replied to the following two queries: 1st. Is it commercially practicable to produce an illuminating gas by generating hydrogen or any combustible but non-luminous gas, and afterwards saturating it with the vapor of petroleum or other hydrocarbon oil or spirit? 2nd. Is it possible that an illuminating gas, generated in the manner proposed, could be used as a substitute for ordinary gas?

Mr. R. J. Spice, of London, said that, in the present state of the coal trade, they should try to seek some relief from other quarters; and if water gas could be made at less cost and of eqal quality so far as the lighting properties are concerned, a great benefit must be conferred upon gas companies.

Mr. Jones, of Dover, submitted a paper on "Gasholder Capacity compared with Consumption," in the course of which he said that, from returns made to him from 153 gasworks, he found the average was 89·77 per cent. in comparison with the maximum daily consumption, and that the extremes ranged from 32 to 200per cent.

This was the last paper brought before the meeting.

Some routine business was then transacted. The report of the committee was read and approved of. In reference to the proposed amalgamation with the North British Association of Gas Managers, the chairman (Mr. A. Angus Croll), read the following resolution from that body: "That while the Association desires to maintain friendly relations with the British Association of Gas Managers, by having combined meetings as frequently as possible, and in other ways to promote the interests of both societies, it is resolved that the North British Association, in the meantime, shall retain its independent position, and take charge of its own funds and all other matters necessary to its continuance." The office bearers for the ensuing year were then appointed: Mr. G. T. Livesey, Metropolitan Gas Company, London, President; Messrs. James Patterson (Warrington), Joseph Wood (London), and Thomas N. Kirkham (Imperial Gas Works, London, Vice Presidents; Mr. W. H. Bennett Secretary. Dr. Stevenson Macadam, of Edinburgh, was elected an honorary member of the Association. The next annual meeting was fixed to be held in London on the second Tuesday of June, 1874. With a vote of thanks to the chairman the business of the meeting was brought to a termination

In the evening a banquet was given to the members of the British and North British Gas Managers' Association by their Scotch friends. There were present upwards of 300 gentlemen. After dinner various toasts suitable to the occasion were proposed and pledged. The toast of the evening, "The British Association of Gas Managers," was replied to by Mr. Jabez Church, ex-president of the Association, owing to the indisposition of Mr. Croll. He said the Association of Gas Managers had been established ten years ago, and the child which was born at that time had grown and prospered until it now presented a most healthful and robust appearance. That was a source of congratulation to them all The Association had been formed to enable them to have a social interchange of thought on matters pertaining to their profession, and to afford an opportunity to the younger members to profit by the wisdom and experience of their elders; and what the juniors learned in this manner they ought to acknowledge with gratitude, and appreciate as of the greatest value. He thought the Association had done good, not only to its own members, but to the public generally. According to his own experience, he thought the interests of gas managers were identical with those of the shareholders and consumers. If they were not, they were placed in a false position. Assuming it to be the fact, however, it behoved them to determine the best means of producing an article of the greatest possible importance, both commercially and socially. Without being egotistical, he thought they might look upon themselves as lights of the present day. He would endorse the statement made by the chairman, that they might be proud of ealightening the British public, but he thought there should be a spirit of emulation, and that they should not be satisfied with merely the present enlightenment. It appeared to him that great improvements might be made, both in regard to the manufacture of gas and the cost of its production. They should embrace all inventions of a practical nature which would assist in the development of such improvements, because in doing so it would be to their interest individually, as well as collectively,

On Thursday the annual session of the Association was brought to a close by an excursion to Loch Long, on the Clyde, and Loch Lomond. About 400 ladies and gentlemen availed themselves of the opportunity of seeing some of the finest loch and mountain scenery in the west of Scotland. A special train conveyed the party from Edinburgh to Helensburgh, whence they were transported, by steamer, up Loch Long, *via* Greenock, Gourock, and Dunoon, to Arrochar. From thence the ladies were conveyed in carriages, and the gentlemen proceeded on foot, to Tarbet, on Loch Lomond, where they embarked on board the "Prince Consort" steamer. Champagne luncheon was served on board, and the party sailed down the loch to Balloch, where a train was in waiting to take them to Edinburgh. The English visitors to Edinburgh were greatly surprised and delighted at the kind way in which they were entertained, and the unbounded hospitality which they received. The arrangements for the conference of the gas managers were everything that could be desired.

New Philadelphia Gas-Works.

The *Coal and Iron Record* gives us, through a Correspondent, the following information:

"We believe that it is an incontrovertible fact that the gas-works of Philadelphia, whether we consider the amount of capital employed, the extent of the works, the quantity and quality of the gas produced, or the price at which it is furnished to the people, stand unrivalled on this side of the Atlantic, and perhaps in the world.

"Of the capital employed: The last annual report of the Board of Trustees, for the year ending December 31st, 1872, estimates the total value of the works, as per inventory, at $10,305,537.38, which sum does not include the goodwill or the valuable franchises secured to the corporation by the several enactments of the State Legislature. Furthermore, it is no exaggeration to state that to-day private capital might be found willing and ready to relieve the city of it at double these figures.

"As early as 1835, the building and operating of these works, now grown to such mammoth proportions, were first considered. At that time, the proposition met with some opposition, but this was in a measure quieted; and in March 1836, a majority of city councils were induced to authorize a loan to the amount of $150,000, to be expended in organizing and getting in operation this much needed enterprise. At subsequent periods, as circumstances demanded more

capital to maintain the enterprise, to extend its capacity in accordance with the growth of the city, and also to complete the purchase of the several district gas works (which had during the interim been established) at the time of the consolidation of the many adjacent districts with the city proper, other loans were found necessary and authorized. The total amount of capital raised since the establishment of the works in 1835 now foots up $7,120,740. It may be added that none of the loans were sold below par. Of these loans matured and paid there was in amount some $1,370,000, leaving $5,750,740 to become due. The last loan authorized was on October 26th, 1871, due January 1st, 1902, for 500,000. All these loans pay an interest of six per cent. per annum.

"During the period that these loans were being negotiated, a sinking fund for the redemption of the same has been maintained; appropriations being yearly made to it out of the net profits of the works. There is now placed to the credit of this fund in the City Treasurer's office $5,172,252.60, as an offset to the debit of those loans to become due, amounting to $5,750,740. The profits of the works for 1872 footed up $548,563.47. Of this amount, $448,418.32 was expended in liquidation of interest on loans and stock, and the balance was passed to the credit of the sinking fund; being a net profit of $100,085.15. The accumulated net profits since the construction of the works amount to $1,877,888.94, this being used as a working capital, and expended in construction and repair of works, over and above loans created for the purpose. You can judge of the magnitude of these works when I state that there are in constant operation 1,345 gas-retorts, yielding about 7,000,000 cubit feet of gas during each and every twenty-four hours. Total quantity manufactured last year was 1,486,969,000 feet. The largest consumption in any one night was on December 24th, amounting to 6,625,000 feet. Five hundred and eighty-four miles of street mains have been laid, and about twelve hundred men are kept constantly employed. In 1836, when the works were first put in operation, the total supply to private families was 2,952 lights; public lights, 165. Last year 999,251 private and 9,023 public lights were supplied. The price of gas to private consumers is but $2.30 per 1,000 feet. Meters are furnished free to consumers.

"The value of coal consumed this season reaches the immense sum of $1,110,861.34, being about equally divided between the Pennsylvania and the Westmoreland Gas Coal Companies.

"Parties furnishing the iron work in its various shapes were the Messrs. Jesse Starr & Sons, proprietors of the extensive and well-known Camden, N. J., Iron Works; the equally well-known firm of Morris, Tasker & Co. Horace T. Potts and James F. Stillman, of Philadelphia, supplied the larger castings; Samuel J. Cresswell, Jr., with others, are the parties who furnished the smaller castings. The sum paid for all descriptions of iron work amounted to nearly $1,500,000.

"As stated in the commencement of this article, the gas works at Philadelphia are managed by a Board of Trustees, elected by the city councils. The board at all times consists of twelve members, four being elected each year, who serve without pay or emolument of any kind. It is believed that in the figures here given ample evidence is presented that they have not violated their trust, and that financially their administration has been a success. Even with the fact admitted and recognized by these trustees, that it is in their power to so manipulate their employees as to individually as well as collectively advance any political movement they may desire, yet it is equally well-known they refrain from exercising such power, and that each employee, in his political opinion and action is left to exercise his own free will. In fact, this gas company is a sort of 'civil service reform,' which has been quietly organized; and all in power appear to take a pride in having it honorably maintained. When appointments are made from the mass of applicants, the best man for the vacant position is selected; and promotions are made in accordance with abilities exhibited, while good behavior insures a retention of position. Your correspondent remembers that in 1861, the present able chief engineer, Thomas R. Brown, Esq., occupied a minor position in the office; and now merit alone has secured his promotion to to the most responsible position in the gift of the trustees. And, furthermore, it is admitted that much of the success of their management is due to him. In 1857, Samuel M. White, Esq., the present efficient cashier, was in a subordinate position. So, too, in 1865, was Thomas Noble, the present Registrar. Other instances could be cited corroborative of the fact that political influences do not control appointments and promotions, and in no wise interfere with the workings of the institution.

"The present trustees are: Nathan Hilles, President; Robert H. Beatty, Henry Burum, Richard R. Campion, Charles E. Graff, Nathan L. Jones, Samuel S. Kelly, William R. Leeds, James McManus, Albert C. Roberts, M. Hall Stanton, Fred. G. Wolbert.

B."

[From the New Orleans "Picayune."]

Important to Landlords and GasConsumers.

GAS LIGHT MADE CHEAPER THAN KEROSENE—NO MORE FEARS FROM GASOLENE—NO MORE DEATHS FROM LAMP EXPLOSIONS.

OFFICE OF NEW ORLEANS GAS-LIGHT CO.,
June 28, 1873.

On the 1st of January, 1874, upon the completion of the new works now being erected by this company, the price of gas in this city, within the limits supplied by it, will be reduced to *three dollars* per one thousand cubic feet to all consumers for prompt payment in cash.

New Orleans will then be the most cheaply lighted city in the Union, considering distance from the coal fields.

This reduction in price is intended to leave no valid excuse for the use of any illuminant but gas along the lines of the company's mains, fully one third of which, passing through well built streets, are now, and have been since they were laid, unproductive of income.

This publication is now made, six months in advance, for the benefit of landlords and householders, owning the smaller class of tenements, in order to give them ample time before the next busy season to fit up their premises for gas, and thereby secure better tenants and better rents next October.

However small the house, the economy will be great. If insured, the rate of premium will be lessened; if not insured, the risk of loss will be decreased.

The immediate and certain advantages to be reaped by the public are:

1. A daily saving to each of ten thousand families of one-fourth the present cost of one of the necessities of life.

2. A decrease in the number of destructive fires caused by the use of the volatile distillates of petroleum.

3. A saving of human life, by substituting the stationary chandelier or wall bracket for the brittle glass lamp.

4. The most convenient and softest light brought within the means of the most economical household.

While, however, the public will be the sole immediate beneficiary from this decrease in the price of gas, on the other hand, in the present depressed condition of trade, the experiment of reducing by 25 per cent. the cost of an article of limited use, for the purpose of increasing the demand, can be made profitable to the company only by the accession of a sufficient number of new consumers to compensate for the great reduction in its current receipts; and this result we confidently expect; and it will become the interest of all present consumers of gas, to induce their neighbors to adopt this light, in order that the low price may not only be maintained, but still further reduced in the future.

The attention of consumers is also directed to the use of gas for cooking and heating purposes. At the proposed price, gas as fuel will be more economical than wood or coal, and less troublesome than either. In Europe and in the northern cities of the Union, the use of gas for warming buildings and cooking is extending daily. In order to be prepared to supply freely any demand which this reduction in price may create, additional buildings and apparatus are being erected by this company, at a cost of $400,000, which will, when completed, increase its manufacturing capacity to 4,000,000 cubic feet of gas per 24 hours.

The new purifying house will be ready for use in January, and the retort house in a few months thereafter, and the improvements to be introduced in the construction and operation of the apparatus are expected sensibly to reduce the cost both of manufacture and purification, while improving the illuminating power of the gas.

Upon these considerations, the company hopes that this movement will be welcomed by its old patrons in the same spirit which has inspired it, and that it may be but the first in a series of measures which will more closely still identify the interests of the company with those of the gas consumers

By order of the Board of Directors.

JAMES JACKSON, President.

Correspondence.

[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—ED.

Cooking by Gas.

55 MILBANK STREET, WESTERN LONDON,
May 23rd, 1873.

Mr. Editor: At the invitation of the Committee of the British Association of Gas Managers, I last year wrote a paper on "Cooking by Gas," which paper was read at the meeting of the Association in June last year. The paper was a small production, expressing some of the conclusions which I had come to after some eighteen years practical and experimental experience in gas cooking, and was intended mainly to evoke discussion at the meeting.

Of the merits or demerits of the production I need say nothing—it answered the purpose for which it was written, namely, it evoked discussion—you sir, at all events, thought it worthy of a place in the columns of your Journal, and did me the honor to publish it.

I have not been a reader of your Journal (a defect now to be remedied), and was therefore quite unaware of the correspondence which appears in your issues of December 2d, February 3rd, April 2nd and 16th, until to-day, when a friend placed the Journals of those dates into my hands.

With Mr. Ohren's remarks I care not to deal, although he scarcely puts my position rightly; but to correct this would necessitate a partial reproduction of the paper itself. Mr. Ohren and I differ in opinion on several points, which came out in discussion; but although we so differ, I am quite sure that we shall never, in conduct towards each other, violate the rules of courtesy, or fail in manifestation of mutual (as I am happy to believe) respect.

I am compelled, however much against my will, to make a few remarks on Mr. Keeling's—what *can* I call them—well, *extraordinary* letters. I must assure you, however, that I only make these remarks out of regard to the opinions of yourself and your readers. Had the letters appeared in a British journal, I should not take the trouble to comment upon them, as I should feel assured that here his letters would be estimated at exactly their true value. They are strongly marked with the character of self-importance, and of assumption of knowledge, and I cannot but sincerely regret that Mr. Keeling has fallen into the lamentable error of supposing that insolent reflections on successful men in America and in this country, will tend to the elevation of his own position.

In so far as I am concerned, it may be clever or "cute" to describe my little paper as "a learned dissertation" and to enquire "who told him what he knows about cooking?" The description implying pretentiousness on my part, and the question, not only that there is, or ought to be, a monopoly of knowledge *somewhere*, on the subject, but, in addition that it is remarkable that an individual who has had ten years close association with an engineer of the highest reputation in the gas world, the late Alexander Wright, and twenty-two years connection with gas matters, should have learned something.

Mr. Keeling then, completely ignoring the facts of the case, proceeds in the most amusingly absurd way to correct me, or my paper, with a "trivet" and a "gas bracket," and with Mr. Ohren. All this is simply laughable, but not so is the following expression: "When Mr. Magnus Ohren recommends 'Citizen' to buy one of Wright's stoves, he and Hartley know how it is themselves, as Hartley runs the establishment of the late Alexander Wright, whose name it bears." The only construction which can be put upon this expression is, that while, in appearance, holding somewhat divergent opinions, Mr. Ohren and I, are really acting in concert for our mutual advantage and are, and have been, actuated by mere mercenary motives. No suggestion can be more untrue, and Mr. Keeling *ought*, from his association with me, to have known better than to suggest such a thing.

The facts are as follows: In my "connection" neither Alexander Wright & Co. or myself are interested, in a commercial sense, directly or indirectly in the manufacture or sale of gas stoves, and the stoves mentioned by Mr. Ohren are made by John Wright & Co. of Birmingham, a firm having no relationship or connection with that of Alexander Wright & Co., which I "run."

In another passage in the first letter, Mr. Keeling again exhibits ignorance of, or disregard to, facts. e

says, "These two gentlemen speak of cooking and heating by gas in England as if it was something to be introduced, when really it is more general and common (where gas is cheap) than any other known methods." Well, the paper was read before a large meeting of gas managers, who, if not as wise as Mr. Keeling, certainly know *something* about the matter, and I think the character of the discussion is such as to convince any intelligent individual of the correctness of my position. Gas is largely used for heating and cooking in England, but the idea that it is *generally* used for these purposes, is utterly fallacious.

There is one little matter more, which as it made me laugh very heartily, I must notice. It is the utter incongruity between Mr. Keeling's criticism and his own conduct. He does not hesitate to suggest, what I may call, "mercenary advertising motives" to myself, and yet he concludes his first letter by advertising *his own burner*, and the second by advertising *himself as a marvellous retort setter*. Verily this is very droll, and one cannot but wonder how *such* a critic should make such mistakes.

I must express regret at the length of my letter, and will only further say, that it is written without the slightest bitterness towards Mr. Keeling, whom, in spite of the error he has committed, I wish all the success that *wisely* directed effort deserves.

I am, Mr. Editor,
Yours most obediently,
F. W. HARTLEY, A. I. C. E., Etc.

The Gas Strikes in New York and Brooklyn.

NEW YORK, July 13, 1873.

Mr. Editor: It is well known that the stokers and helpers of the New York Gas-Light Company lately struck for eight hours, and the hands of the Brooklyn Gas-Light Company against a reduction of wages, but the fact has not yet been mentioned, that in both works the hands who struck were all *Irish*, not a single man belonging to another nationality being among them.

In both places new men, mostly Germans, were put to work, and it took not over a week to produce a full supply of gas, thereby demonstrating that it requires but muscle, and very little routine, to do the work as stoker or helper in a gas works.

During the strikes some of the daily papers complained that the men were overworked, and not even sufficiently paid, but I have not yet seen a comparison made between the laborers in gas works in this country and Europe. Here the stokers tend their fires, and with the helpers do the drawing and charging of the retorts, giving the men always fully four hours out of twelve for rest, and for this work stokers receive $3.50, and helpers $2.75 a day.

In Europe, besides firing, drawing, and charging, the stokers and helpers must, during the intervals, wheel their coal for the charges, and are compelled to do all kinds of work about the premises, unloading coal, etc., and for *working all the time* they receive from *fifty to eighty cents* per day.

Now, taking the higher price of living into consideration, it strikes me that in this city and Brooklyn, $3 and $2.50 per day is all the work is worth, and that plenty of men can be procured at such a price, at least for the time—from September to May—and for the remaining four months an increase of wages might be allowed, or "eight hours work" arranged for, as the summer heat tells hard on the hands in a gas works.

Finally, I venture to say, that the work could be made much more endurable; the men, especially new beginners, should not be placed in front of a bench with all retorts opened, the charges should be made by sections, first lower, then upper, or *vice versa*, and the suffering from the heat will not only be less, but the capacity of production increased, by gaining additional working time for the retorts.

Yours respectfully,
PRACTICAL GAS ENGINEER.

Sunday Rest in Gas Works.

A gentleman writes us as follows from the New Orleans Gas Company:

NEW ORLEANS, June 25, 1872.

Mr. Editor: Would you please inform me where I could get a copy of "Dunbar's Retort Setter's Guide." I wrote to you some time past and received no answer. I am anxious to get a copy.

Perhaps it would be a little information to let you know that we are giving the stokers the benefit of a rest on Sunday. We commenced on the 20th of April to let the day gang off, from 5 A. M. to 5 P. M., except so many as were necessary to attend to the fires. The men like it so well, that it is hard for those who are drawn by lottery to stay in, to get a substitute at any price. Of course it entails a loss to the company, we having to keep two extra benches always working; but there is a great deal of humanity in our Superintendent (Theobald Forstall, Esq.) and he carried the idea out well.

New Gas Company.—As may be seen by a petition presented to the Common Council last evening, a number of gentlemen, represented by Augustus L. Allen of this city, propose to organise a new gas company. They claim that a better quality of gas than that which we have hitherto been supplied with, and at a cheaper rate, can be furnished with a reasonable profit to the manufacturers. The petitition for the formation of such company was granted.—*Poughkeepsie Press, July 24.*

The State Geologist of Missouri, who has been visiting the coal region of Bates County, reports that he has found coal beds of from one to four feet thick in every part of the country excepting the northeast, northwest and central portions. Near the line of Bates and Vernon is a valuable field of coal, varying from three to five feet in thickness.

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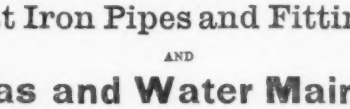

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☞ All communications to be addressed to "THE EDITOR, No. 42 Pine Street, Room 18, New York.

SATURDAY, AUGUST 2, 1873.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS*, or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

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MR. ROWLAND'S INVENTIONS.

Some brief space, though far from adequate to the importance of the general subject, or of the special occasion, must be devoted to comment; in view of the magnificent illustrations which, by the kindness of this inventor, we are enabled this week to lay, for the first time, before the American public.

The gas profession, at this day, will not expect much space to be devoted to the discussion of the eminent necessity of perfecting as speedily as possible, our plans of stoking by steam power in all large gas works. There is no country probably in which this so important as in America, where the labor account forms so very large a proportion of the cost of making gas. Our numerous and disastrous strikes, of late years, should also, and must, give a great impetus to this movement. At the same time, it must be admitted that the difficulties to be overcome are very great, these difficulties being largely of that species which are appreciable only by a practical expert, and even by such a one only upon careful observation and experiment on a working scale. Mr. Rowland, as an inventor in this field, enjoys the advantage, in connection with his well-known high genius and attainments as an engineer and machinist, of a practical familiarity with gas-works and gas apparatus. A special wonder that strikes us, in contemplating this present work of his, is that his other innumerable and absorbing occupations should have permitted him to devote the time for the elaborate and complex study and contrivance displayed. Mr. R. stated to us in fact that these devices were all mentally worked out by him, during the last year, *while travelling by rail*, an occupation in which much of his time is necessarily spent.

Before Mr. Rowland left for Europe a few weeks since, we had the pleasure (by invitation) of inspecting the operation of his large working model at his shops (the Continental Iron Works); and certainly few more interesting or impressive sights could have been found. The elegance and simplicity of the devices and combinations by which such beautiful results are accomplished justify a reference to what has been called the "poetry of mechanism". Not to say, however, but that there is "more truth than poetry" here.

It is a subject of regret to us that the large space required forbids our transferring bodily Mr. Rowland's specification (a specification drawn up, as might be expected from its source, without a redundant word) to our columns. The portions omitted, however, relate chiefly to the details of the charging and drawing apparatus, and will, we think, be made out tolerably well by most engineers, by inspection of the excellent cuts we are enabled, through the courtesy of Mr. Rowland, to present.

That our admiration for these beautiful inventions should be absolutely *unqualified*, will probably not be expected. The combination of automatic devices for elevating, conveying and measuring the coal has great and indubitable novelty and merit, but we must add that the charging of a vertical tier of three retorts at once, and of closing the same by one lid (as represented in the cuts) have already been fully tried on a working scale by previous inventors in England (Best and Holden for example). The difficulties of the one lid for three retorts, consisting chiefly in the liability to lose shape and crack, through unequal heating, and warping, and through the great force required to fix them in place, may possibly be overcome by the ingenuity and great constructive talent of Mr. Rowland; but one difficulty which is inseparable from the charging of three retorts simultaneously in one bench, seems insuperable. This is the great and sudden depression of the *heat* of the bench which must follow. It is not to be forgotten also that under this arrangement, unless modified in some way (which may, however, be easy), if one of the retorts in the vertical tier be disabled or disused, the other two become useless. Doubtless the inventor will be equal to all such points of practical difficulty as soon as he may become convinced of their actuality.

MUNZINGER'S INVENTIONS.

We have from Mr. P. Munzinger, the learned and ingenious Gas Engineer of the Pascal Iron Works, Messrs. Morris, Tasker & Co., two finely illustrated pamphlet publications of much interest, one upon the *photometer*, the other upon *roof-construction*. In the first he describes briefly the Rumford and the Bunsen-King photometers, and regarding the latter, gives and demonstrates a formula for calculating the divisions of the bar for different lengths of bar up to 140 inches, with extensive tabulations derived by the application of his equation.

Mr. M.'s ingenuity and skill are illustrated by the following foot-note, which we copy:

NOTE.—I have now in use a Bunsen's Photometer, constructed by myself, of which the following is a general description:

The lights are adjustable from 60 to 140 inches with an independent scale 80 inches long, divided into ins. and 10ths. The candle is weighed by water. By this means it enables me to read the thousandth part of a grain—no matter what the vibration may be, it is not affected. The Disc is provided with two lenses, which brings the two lights into one centre. The disc which carries the lenses is provided with a scale which will enable the operator to measure the hundreth part of an inch.

The governors which I use for regulating the pressure have no valves of any description, and work automatically. The clock and meter are started and stopped by electricity. The clock is run by electricity, and attached to a large regulator. The pressure registers are two in number, so connected as to enable the operator to read the tenth or hundreth part of an inch. The lights are provided with two self regulating flues, which are operated with an electro-magnetic thermometer, and enable the operator to have a uniform temperature for two hours. The adjustments of the table are micrometer screws. The room has a board lining about six inches from the wall, which is covered with zinc and then with black cloth. The space between the wall and partition is kept at a uniform temperature by means of a fan.

I have also in connection with the above, a mercurial specific gravity apparatus, which enables me to obtain the specific gravity of the gas during experiments.

In the other *brochure* Mr. Munzinger calculates mathematically the true strain upon every part of an iron roof frame, and the best form of combination to secure the greatest economy with the needful safety. He has combined the researches and formulæ of Rankine, Mosely, Van Knaven, and Weisbach. It appears to us that these pamphlets are probably intended as exemplars of a more extended work by Mr. M., but upon this point we have no communication from that gentleman.

THE GAS-LIGHT ASSOCIATION OF THE UNITED STATES.

A majority of the more important Gas-Light Companies in the United States, before they receive this issue of the Journal, will have already received copies of the Constitution of the new Association, as drawn up and ratified by the em-

inent representatives of the Fraternity who convened for the purpose in New York in April last. With the Constitution were sent other important circulars, which we entreat the recipients to respond to without delay. It is the intention on the part of the determined men who have started this movement, that the thing shall not be done by halves. They expect and feel sure that the whole of the American profession will sustain them at once in this undertaking, that no time will be lost in establishing a powerful Association on a perpetual basis, and that the first annual meeting on the 15th of October next will be such a grand success as to leave no further doubt of the solidity and perpetuity of this basis. The Editor of this Journal, as Secretary, realizes the onerous duties which have devolved upon him. It is his most earnest desire that no Gas Company in the United States shall fail to receive an invitation to join the movement, and a copy of the Constitution. Many difficulties, however, stand in the way of accomplishing this. The best list of the Companies throughout the country that the Secretary has thus far been able to procure by his utmost efforts comprises less than 400 corporate names (some of these probably not being correct.) To all these invitations have already been sent, but it is certain that they cover not much more than one half of the existing Gas Works. One gentleman of the fraternity, in fact, promised many weeks since, to the Secretary a copy of a list which he has been engaged for years in collecting, which includes some 750 Works. This, however, has not yet come to hand, and may not do so in time to be of service.

Under these circumstances, the Secretary is forced to make an earnest appeal to the Fraternity for aid in this matter. In the first place let every one of the Profession who reads this paragraph and who has not received the circulars, immediately notify the Secretary on his own behalf, as well as on behalf of any Company that he may know of that has been unwittingly omitted. Also if any gentleman has had occasion to make lists of the Companies throughout States or sections of the country, for business, professional, or other purposes, the transmittal of a copy to the Secretary would be highly appreciated and thankfully acknowledged (through the Journal if not objected to).

THE EDITOR'S REPORT ON THE PASSAIC RIVER.

This document, which has been laid before our readers in full, has received so great commendation from high quarters as almost to arouse what little modesty the editorial profession may be supposed (or hoped) to have left us. One notice, to which we attach particular value, we shall copy in part, as a sample. It is from the pen of Prof. Joy, of Columbia College; in introducing the document to the readers of the *Journal of Applied Chemistry*:

"The exhaustive character of this research, the nicety and accuracy of the methods employed, the originality and novelty in the treatment of the subject, and the valuable practical suggestions derived from it, will very greatly add to the already high reputation of the author, and will afford an admirable model to chemists who may be called upon to pursue investigations of a similar nature. Prof. Wurtz gives in the introduction to the report a review of the methods hitherto employed for the determination of the organic constituents of water, and of the theories more recently advanced in reference to the part played by such constituents in rendering potable waters so dangerous to health, as being often the disseminators of typhoid and cholera germs. Hitherto chemists have looked to the mineral constituents of water, and have neglected the organic. A fair proportion of lime and other mineral matter is now regarded by Dr. Letheby and other authorities as adding to the value of drinking water, whereas Pettenkofer, Wurtz and others show that great danger may arise from organic matter."

MR. HARTLEY ON GAS-MEASUREMENT.

Our readers will not fail to observe that the distinguished Engineer, Mr. Hartley, of Westminster, England, has honored us with a communication to be found in our Correspondence columns to-day. Upon the personal matters therein referred to we have nothing to say. Our particular object in referring to Mr. Hartley here, is to direct attention to a small work of his, a copy of which he has favored us with, on Gas-Measurement and Gas Meter Testing, which should be procured by the whole profession. The whole of this extremely important subject is here treated in a concise and masterly manner, in the compass of some 44 pages of text and 20 of tables, with fine cuts interspersed. The copy sent to us is a new (1873) edition, the third, and is posted up to the times. Room will not permit any detailed review.

THE CONSTITUTION OF THE ASSOCIATION, ETC.

All these documents are and have for some time been printed and ready for distribution, but unexpected and imperative absence of the Secretary, and sudden illness of his Assistant, caused some fresh delay. It will be well to remark here that it is hopeless to expect that *all* the Gas Light Companies in the country will at once be reached, as much time and labor must be allowed for the making out even of a complete list, a consummation which will be only arrived at in fact, by degrees. Before this issue leaves the press, the major part of the fraternity will have been served with copies.

☞ We Would Direct special attention to the advertisement on this page headed "A German Gas Engineer." The gentleman advertising is well known to us, and his statements may be relied on. Under our Correspondence head in this issue is a communication headed "The Gas Strikes in New York and Brooklyn," which is from the pen of this gentleman, and from which some idea of his qualifications and experience may be formed.

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TO THE PROFESSION.

SITUATION WANTED by a young man who understands the Repairing of Gas Meter, erecting Street Lamps, Gas Fitting, and how to take the statement of Meters. He is capable of taking charge of a small Gas Works. Has had six years experience in the business. Addres, J. T. WHEELER, Indianapolis, Ind., care of JOHNSON, BROS.

TO GAS ENGINEERS—A YOUNG MAN of liberal education, who has served at Gas-fitting, Laying Street Mains, Setting Lamp Posts, Setting Retorts, and all the daily duties of a large Gas Works, wishes a situation with an active Builder of Gas Works, to learn the profession in all its branches. Is willing to work and anxious to learn. Address C. L., care of Dr. Wm. M. Murphy, 69 West Seventh Street, Cincinnati, Ohio.

A NEW INVENTION

FOR LIGHTING STREETS.

FROM REPORT OF
THE FRANKLIN INSTITUTE

PHILADELPHIA, Jan. 20, 1873.

The Committee on Science and the Arts, to whom was referred for examination

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By order of the Committee.
D. S. HOLMAN, Actuary.

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ATLANTIC CITY, August 20, 1872.

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(Signed by the Mayor and every Member of the City Council.)

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WILLIAM G. BARTLETT,
ALBERT BROTHERS,
BARCLAY S. SMITH,
CHARLES PALMER.

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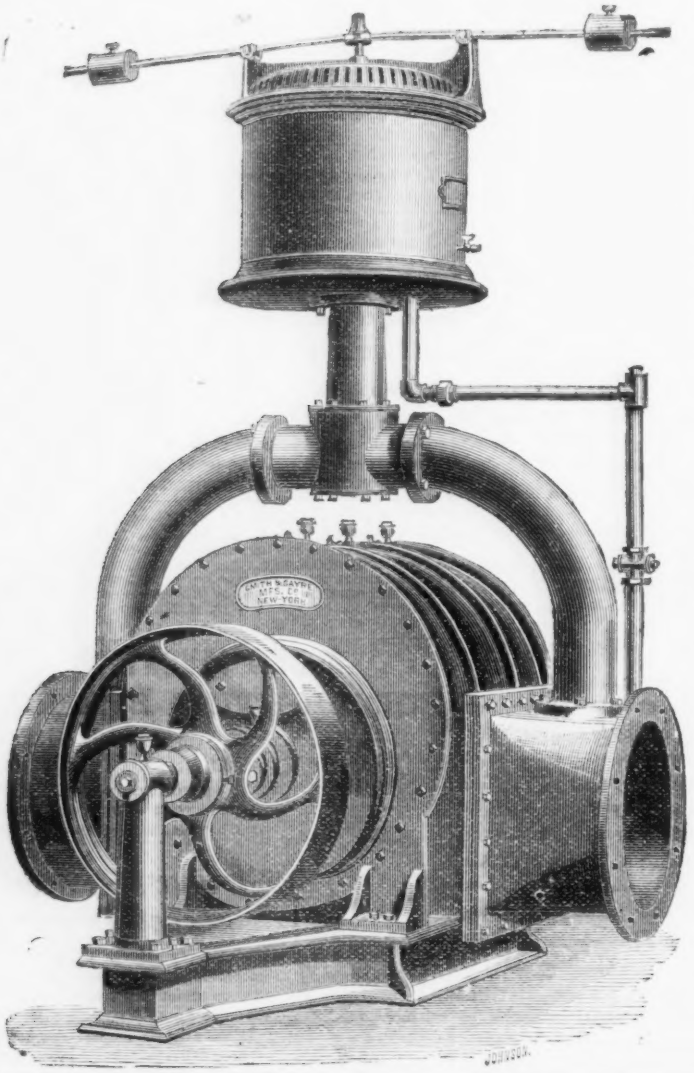
The Mackenzie Patent Gas Exhauster

And Patent Compensator.



They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable, cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

We are also sole proprietors and manufacturers of the

MACKENZIE PATENT BLOWER, PATENT CUPOLA AND SMELTING FURNACE.

The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary Fan.

The Cupolas are manufactured in sizes to melt from 1 to 20 tons per hour, will save one quarter of the time required by the old style Cupola, and 33 per cent fuel. Address

CHARLES W. ISBELL, Secretary. JAMES M. SAYRE, Treasurer. G. G. PORTER, President.

OFFICE, 96 LIBERTY STREET, New York.

AMERICAN

GAS SCREEN MAN'F'G COMPANY.

TO GAS-LIGHT COMPANIES.

Your attention is respectfully called to the GAS SCREEN now being manufactured by the American Gas Screen Manufacturing Company, under the patents granted to E. DUFFEE, and are pleased to submit the following points of their excellence and superiority over all other screens now in use.

The Screen is made with an oak frame, interlaced with split rattan, drawn through holes at regular intervals in the Frame and cross-pieces, the edges of the frame being grooved to prevent abrasion.

The advantages of the screen are:

1st. The large purifying surface, the construction of the Screen giving over three-fourths of the surface for the gas to penetrate the lime.

2d. On account of the free passage of the gas through the Screen the pressure is reduced, thereby preventing the accumulating of carbon on the retorts.

3d. The saving of lime and labor, as the Screens are not liable to clog, and are easily cleaned.

4te Their cheapness and simplicity of construction.

5th. Their DURABILITY—they can be used longer than any other now used.

Testimonials.

PROVIDENCE, RHODE ISLAND, March 21st, 1872

E. DUFFEE, Esq., Agent, etc.

Dear Sir: The Trays manufactured by you for our West Station were put in use in September last, and have *given perfect satisfaction.*

The frames are well put together, and I see no reason why ey will not last for a long time. The *very large amount of n space* in these Trays gives the gas an easy passage, and brings it into contact with the lime much better than when the space is so contracted, as is the case in most of the other Trays in use.

The pressure thrown upon the retorts by contracted passages is very great, and were gauges used more frequently than they now are in many gas-works, this facat of having *open Trays* would become more apparent to mangers of gas works. The digerence in pressure at this station in passing the gas through your purifiers, is two-tenths (2-10) inches.

The amount of gas purified, per bushel of lime used to this date, is six thousand five hundred and fifty six (6,556) cubic feet.

Respectfully yours,
JAMES H. ARMINGTON, Supt.

BOSTON GAS-LIGHT CO., Dec. 1871.

Dear Sir: In answer to your inquiry how we like your Patent Tray for dry gas purifiers, I take pleasure in saying we have used them exclusive of all others, for the last three years, and think them far ahead of any yet offered. The surface being nearly three times that of any other Tray, and their lightness and durability perfectly satisfactory.

Yours respedtfully,
A. M. GILES.

EDWARD DUFFEE, Esq.

EAST BOSTON, JUNE 15, 1871.

Gentlemen: We have used your Screens some five years. They give perfect satisfaction.

I consider them *by far the best Screen* for Dry Lime Purifiers I have seen. Yours truly, A. M. NORTON, Supt.

CHELSEA, May 1, 1871.

Mr. E. DUFFEE.

We are using your Purifying Trays, and find them to be the *best of any* that I have used, and will *purify more gas with less pressure* than any tray that I know. I can fully recommend them, after four years trial, to any Gas Superintendent with perfect safety, as the *cheapest and best Tray made.*

Yours truly, JOHN ANDREW, Sup't.

DORCHESTER, March 3. 1870.

Mr. E. DUFFEE.

Dear Sir: We have had your Gas Trays in constant use for almost one year and six months and find them superior to any others we have ever used, both in point of economy and efficiency. Truly yours, W. B. BROOKS,
Agent Dorchester Gas-Light Co.

JAMAICA PLAINS, MASS., June 21, 1871.

EDWARD DUFFEE, ESQ.

Dear Sir; The Trays ordered by this company three years ago, are getting somewhat worn. I wish to say here that I consider your Trays to be superior to any yet invented, therefore please make us another set at the price named, to be like the sample shown in every way, and oblige Yours truly
JAMES F. ROGERS,
Sup't Jamaica Plains Gas-Light Co.

BROOKLINE, June 11, 1871.

E. DUFFEE, ESQ.

Dear Sir: You will please make a set of Gas Trays for this company as soon as convenient, at price named. In regard to the merits of the Tray, after having them in constant use for over two years, I will say that I consider them *superior to any Tray* manufactured in this country. Respectfully yours,
H. A. ALLYN,
Sup't Brookline Gas-Light Co.

BANGOR, August 2, 1870.

EDWARD DUFFEE, ESQ.

Dear Sir: Yours of the 20th ult. is received. In regard to your Gas Trays, I take pleasure in saying that they have been in use over two years, and have given perfect satisfaction and they are in good order at the present time; should have no hesitation in recommending them, believing they are the most durable and easiest kept in order of any with which I am acquainted. Respectfully yours,
W. H. PERRY, Sup't.

OFFICE OF THE SPRINGFIELD GAS-LIGHT CO.
SPRINGFIELD, MASS., Oct. 10, 1871.

MR. WARD,
President Hartford Gas-Light Co.

Dear Sir: I have been using Gas Screens made by the American Gas Screen Company, for nearly a year, and find them superior in every way to the wooden Screens made and formerly used by the Springfield Gas-Light Co. I can purify more gas with the same quantity of lime, there being more surface to the Screens; and I consider them more durable, and recommend them to your consideration.

Yours with great respect,
GEORGE DWIGHT.

ROXBURY, June 14, 1872.

EDW. DUFFEE, ESQ.

Dear Sir: In answer to your inquiry regarding your Patent Gas Screens, I am happy to be able to say, that after nearly three years constant use we are perfectly satisfied with them being able to purify over fifty pet cent. more gas with them, than with any other Screen we have used.

Yours respectfully,
THOMAS J. FISHOU.

OFFICE DETROIT GAS-LIGHT CO.,
DETROIT, MICH., April 22, 1872.

AMERICAN GAS SCREEN MANUFACTURING CO., HAVERHILL.

Gentlemen: The Screens bought of you work far better than any we have ever used. As a proof, we have with the same quantity of lime purified *twenty per cent.* more gas with your Screens than with any others, and the work well done. The workmen are also better pleased with them—they being light and handy to work. They also relieve the pressure very much upon the retorts, and I cheerfully give yau my experience.

Yours truly,
P. E. DEMILL, Secretary.

We give a list of some Gas-Light Companies using them.

Providence, R. I. Gas-Light Co., Boston, Mass. Gas-Light Co.: East Boston, Mass., Gas-Light Co.; South Boston, Mass. Gas-Light Co.; Springfield, Mass., Gas-Light Co.; New Bedford, Mass., Gas-Light Co.; Manchester, N. H., Gas-Light Co.; Reading, Penn., Gas-Light Co.; Biddeford, Me., Gas-Light Co.; Hartford, Conn., Gas-Light Co.: New Haven, Conn., Gas-Light Co.; New Orleans, La., Gas-Light Co.; Savannah, Ga., Gas-Light Co.; Charleston, S. C., Gas-Light Co.; Trenton, N. J., Gas-Light Co.; Charlestown, Mass., Gas-Light Co.; Dorchester, Mass., Gas-Light Co.; Chelsea, Mass., Gas-Light Co.; Baltimore, Md., Gas-Light Co.; Manhattan, N. Y., Gas-Light Co.; Cincinnati, Ohio.; Gas-Light Co.: San Francisco, Cal., Gas-Light Co.: Albany, N. Y., Gas-Light Co.; Sacramento, Cal.; St. Joseph, Mo., Gas-Light Co.; Leavenworth, Kansas, Gas-Light Co.; Macon, Ga., Gas-Light Co.; Roxbury, Mass., Gas-Light Co.; Lansinghburg, N. Y., Gas-Light Co.; Bridgeport, Conn., Gas-Light Co.; Stamford, Conn., Gas-Light Co.; Poughkeepsie, N. Y., Gss-Light Co; Scranton, Penn., Gas-Light Co.; Lewiston, Me., Gas-Light.Co., and one hundred others.

Address **A. P. JAQUES, Treas.,**
Amer. Gas Screen Man'f'g Co., Haverhill, Mass

AGENCY FOR

GIBSON'S IMPROVEMENT

IN THE

Manufacture of Coal Gas,

42 PINE STREET, ROOM 18.

The undersigned having been appointed Special Agent for the introduction of GIBSON'S Substitute for Dip-Pipes in the Manufacture of Coal Gas, respectfully presents for the consideration of Gas-Light Companies the Circulars and Pamphlet issued by the American Coal Gas-Light Imp. Co., descriptive of the value of GIBSON'S Improvement, and the mode by which Gas-Light Companies can satisfy themselves of its usefulness, without trouble or expense, at their own works.

Orders for fitting up Valves of any desired form or patent, *subject to the generality of the Gibson claim*, and also for SUPPLIES and MATERIALS of every description required for the use of Gas Light Companies promptly attended to by

W. H. GRENELLE, Special Agent.

REFERENCE.—RICHARD MERRIFIELD, Esq., late Vice President MANHATTAN GAS-LIGHT COMPANY.

WILLIAM FARMER,

ARCHITECT AND GENERAL GAS ENGINEER,

111 BROADWAY, TRINITY BUILDING, Room 95, New York.

WILLIAM FARMER may be consulted upon all matters connected with the construction of GAS WORKS and other buildings. Will furnish General and Detail Drawings, Specifications and Estimates for Gas Works of any capacity, Retort Settings, Condensers, Washers, Exhausters, Purifiers, Holders, Coal Hoisting Apparatus, Iron Roofs, and every description of Machinery required in the Manufacturing of Gas.

PATENTEE OF THE FOLLOWING INVENTIONS:

Exhausters for Gas and Foul Lime Ventilation,
Dumping Barrows for Coal, Coke and Lime,
Blowers for Forges,
Pumps for Water, &c., &c.

REFERENCES:

CHAS. ROOME, President Manhattan Gas-Light Company, N. Y.
SAMUEL DOWN, President American Meter Company, N. Y.
C. VANDERVOORT SMITH, Engineer Manhattan Gas-Light Company, N. Y.
CHARLES MOWTON, Engineer New York Gas-Light Company, N. Y.
SAMUEL P. PARHAM, Engineer Mutual Gas-Light Company, N. Y.
Prof. HENRY WURTZ, Editor AMERICAN GAS-LIGHT JOURNAL.
HENRY J. DAVISON, Engineer, 77 Liberty Street, N. Y.
HERRING & FLOYD, Oregon Iron Foundry, 738 Greenwich Street, N. Y.
FREDERICK SABBATON, Engineer Troy Gas-Light Company, Troy, N. Y.
Col. WHITE, Engineer People's Gas-Light Company, Williamsburgh, N. Y.
GEORGE W. PARSONS, Sup't and Eng'r, Rochester Gas-Light Co., Rochester ,N. Y.
GEORGE W. EDGE, Engineer, Jersey City Gas-Light Co., Jersey City, N J.
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Professor SILLIMAN, New Haven, Conn.
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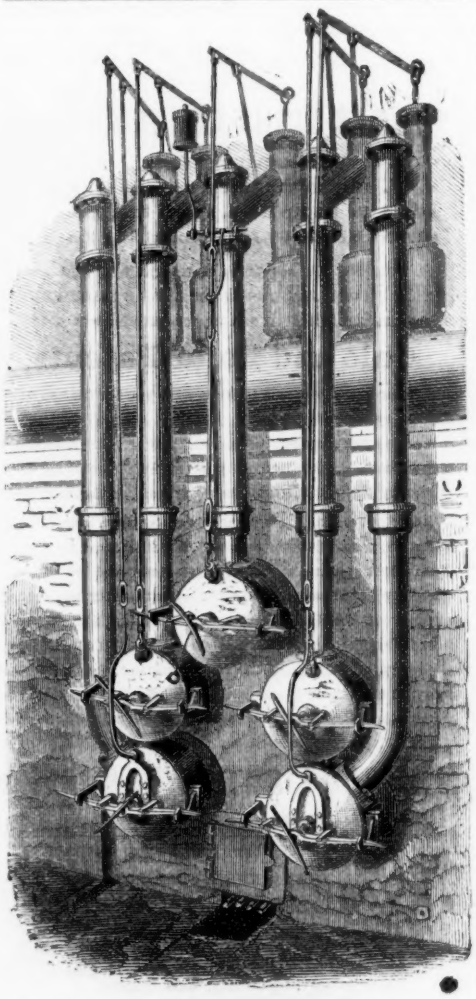
PETER F. BURTIS, Supt. and Engineer, Chicago Gas-Light Co., Chicago, Ill.
JAMES R. SMEDBERG, Consulting Engineer, San Francisco Gas-Light Co., Cal. [254-



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ADJUSTABLE AUTOMATIC DIP SEAL,
AND
Improved Retort Lids.

The Seal closes automatically, when the retort-lid is removed, and is broken by replacing the lid. No mistake can possibly be made. The rods are adjustable in a moment to any contingency. The new attachments are adaptable to any Works. Cost only that of rough castings. No lute used, and no leakage at lids. Half the number of lids only needed. Capacity of mains greatly increased. In new Works no mains No carbon in retorts, seldom in stand-pipes. Addre

CHARLES HUBBARD, JR.,
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OHIO GAS CANNEL,
From the Sterling Colliery.

I am now prepared to place in the market, through my agencies as below, a regular and unlimited supply of this valuable Cannel, for gas purposes. A recent analysis, by Prof. WURTZ, Editor of this Journal, at the Laboratories of the NEW YORK GAS-LIGHT COMPANY, gave 47½ per cent of Volatile Matter and 45 bushels to the ton of a fair quality of coke. The yield of gas was at the rate of 9,500 feet per ton of about 27 candle power. It is not highly sulphurous, can be purified by Lime, and the ash from the coke does not clinker.

GEORGE R. TUTTLE, Proprietor,
Cleveland, Ohio.

GENERAL AGENCIES.
George Merryweather, 5½ Pine Street, N. Y.
252

ATLANTIC DOCK
Iron & Machine Works,
FERRIS, WOLCOTT AND DYKEMAN STREETS,
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HOY, KENNEDY & CO., AGENTS.
Office 98 Liberty Street. P. O. Box 2,348

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ENGINEERS AND CONTRACTORS
For the Erection or Extension of Gas Works.
PLANS, SPECIFICATIONS AND ESTIMATES.

MANUFACTURERS of every kind of Gas Machinery, Retorts Bench Castings, Wrought Iron Work, Multitubular and Air Condensers, Washers, Scrubbers, Purifiers, Exhausters with every equipment complete for large or small Works, Gasholders, Telescopic or Single; Iron Roof Frames with Cornice Gutters, covered with Corrugated Iron or Slate; Iron Doors and Iron Pivot Blind Windows; Coke Barrows, Fire Tools, Retort Lids, Cotter Bars and Screws, Stop Valves, Tar Valves for Regulating Dip in Hydraulic Mains, Pressure Governors for Street Mains, and Compensators for Exhausters that are unrivalled for unvarying accuracy Steam Engines, Boilers, Etc., Etc.

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Post Office Box 2,348. Office 98 Liberty st

CAUTION.

SEVERAL CONTRIVANCES HAVING BEEN DEVISED for the purpose of dispensing with the dip-pipe seal, by means of a valve, or cut-off, between the retort and the hydraulic main, in gas works, since this method of making gas was introduced by the AMERICAN COAL GAS LIGHT IMPROVEMENT COMPANY, all of which are infringements upon Letters Patent, numbered 95,459—116,450—and 119,135, owned by said Company. All Gas-Light Companies are cautioned against the use, without license or authority from the undersigned., of said devices.

The Am. Coal Gas Light Improvement Co.
JOHN H. BLAKE, President.
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Cast Iron Gas and Water Pipe.
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Having withdrawn from the firm of R. D. Wood & Co., the practical management of which we have had since the organization of that firm until June 1871, we have now completed our Works for the manufacture of CAST IRON PIPE and Castings generally.

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Our experience in the manufacture of Pipe for a great many years, has enabled us in rebuilding to practically apply Machinery and Fixtures of the very best character, to insure *good work.*

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Used in the Erection of Gas and Coal Oil Works.

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Engineer, Bayonne and Greenville Gas-Light
303-6m Bergen Point N.

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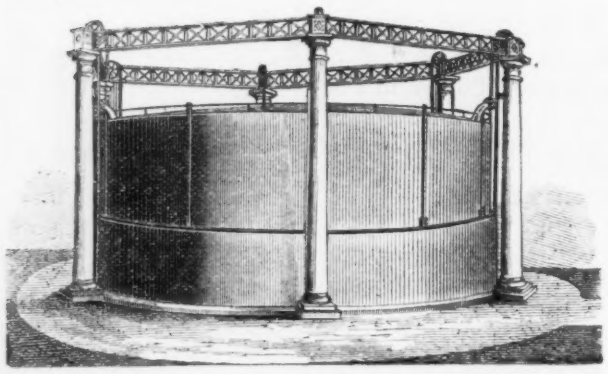
COAL CARS, PURIFYING BOXES, COKE BARROWS.



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Wrought Iron Work for Bridges, Buildings, Steam Boilers, Tanks, Stills, &c.

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Estimates furnished of the cost of Works, and cost to Manufacture Gas in any Locality.

Gasholders,

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Particular attention given to Enlarging and Re-building Gas Works.

For Lighting Manufactories, our Rosin Gas Works have been successfully used for *many years* past. They require but small outlay, and afford a *safe* and *economical* light.

FOR SALE AT MANUFACTURERS PRICES:

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WROUGHT IRON ROOF FRAMES,

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Wrought Iron Work

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PIPE CAST VERTICAL.

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Cast Iron Flange Heating and Steam Pipe.

STOP VALVES FOR WATER OR GAS, ALL SIZES.

Fire Hydrants,

GAS HOLDERS,

TELESCOPIC OR SINGLE.

☞ Castings and Wrought Iron Work of all kinds for Gas Works. 253-6m

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SCREENING SHOVELS.

MADE FROM BEST MALLEABLE IRON AND STEEL.

FURNISHED WITH LONG OR D HANDLES

Perfect in their operation, a very strong, and from their great durability vastly more economical than any substitute. Refer to all the principal gas Companies in the country, who acknowledge them as the "ne plus ultra of Coke Screening Shovels.

Orders addressed only to

O. R. BUTLER,
Sole Agent.
No. 96 Maiden Lane, N. Y.

CAUTION.

Gas Companies, and all parties using Screening Shovels are cautioned against the purchasing (or manufacturing) of any other than myself, or my agents, COKE SCREENING SHOVELS, made either in whole, or in part, of **Malleable Iron,** as such is decided to be an infringement of Butler's Patent of June 4, 1872.

O. R. BUTLER,
96 Maiden Lane, N. Y.

OFFICE OF

THE GAS-LIGHT CO. OF AMERICA.

C. K. GARRISON, President.
E. W. McGINNIS, Secretary and Treasurer.
JOHN P. KENNEDY, Chief Engineer.
LEONARD D. GALE, Consulting Chemist.

GENTLEMEN: We beg leave to inform you, that we have purchased the Patent process for making ILLUMINATING GAS from PETROLEUM and its products, known as the

Gale and Rand Patents,

and we are now prepared to treat with you for the use of said process by your Company.

We are also prepared to contract for putting said process into successful operation in your works, furnishing all the necessary plans, materials, and workmen for that purpose.

We do not deem it necessary to enter upon a detailed description, here, of the processes above referred to, deeming it sufficient to state, to secure your interest and investigation, that they have been in successful operation, for months, in a number of Gas-Light Works in the United States, and are now being introduced in the works of the Mutual Gas-Light Company, of New York City; the Citizens' Gas-Light Company, of Brooklyn; the New Orleans, San Francisco, and very many other Gas-Light Companies throughout the country.

For full particulars, address

THE GAS-LIGHT CO. OF AMERICA.

248-tf] **P. O. Box 5220, New York City.**

THE DESPARD COAL COMPANY

OFFER THEIR SUPERIOR

DESPARD COAL

To Gas Light Companies throughout the country.
Agents, PARMELEE BROTHERS, No. 32 Pine street, N. Y
BANGS & HORTON, No. 31 Duane street, Boston.
Mines in Harrison County, West Virginia.
Wharves Locust Point, } Baltimore.
Company's Office, 29 South street, }

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. Reference to them is requested 204-1y

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EVENS & HOWARD,

Manufacturers of a superior quality of

Fire-Brick, Clay Gas Retorts,

Gas Tile, Drain Pipe, Fine Ground Fire Clay, &c.

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IMPORTERS OF

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Sydney,
Lingan,
Glace Bay, and
Caledonia,

GAS COAL,

AGENT FOR

The Westmoreland Coal Company.

Orders received for the delivery of

Red Bank Cannel

from the Red Bank Colliery, Penn., for shipment after 1st May.

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AND PIPE WORKS.

OFFICE AND WORKS—CARROLL, PIKE, SMALLMAN AND WILKINS STREETS,

PITTSBURGH, PA

WM. SMITH,

Manufacturer of all kinds of GAS and WATER PIPE BRANCHES, CONNECTIONS, T's, ELBOWS, and all CASTINGS USED AT GAS AND WATER WORKS,

We offer special inducements to parties wishing to purchase. My Pipe is Smooth, regular in weights, and cast vertically.

N. B.—Pipe from 3-inch and upwards, cast in 12-ft. lengths.

☞SEND FOR CIRCULAR AND PRICE LIST.☜

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MINED IN TAYLOR COUNTY, WEST VA

Company's Office, 52 S. Gay St., Baltimore.

CHARLES MACKALL, Secretary.

CHARLES W. HAYS, Agent, Room 7, 111 B'way, N. Y.

SHIPPING POINT—Baltimore, Md.

This coal yields 10,000 cubic feet of Gas, with an illuminating power of over 16 candles. Forty bushels of very superior Coke, with little Ash, and scarcely any clinker. 304-1y

CHARLES HUBBARD, JR.,

Consulting Engineer.

Steel and Iron Forgings, Light and Heavy Steel Castings to any pattern. Would call attention to his new article for Blacksmith's Forges, Jones's Patent Tuyere Iron, which is in successful operation in the leading establishments; can be used in any Forge now at work, or in combination with Jones's improved Cast Iron Forge, plain or galvanized. Is prepared to furnish estimates of all kinds of Iron work used in the construction and carrying on of Gas Works, including supplies. Sole agents for A. L. Havens's Adjustable Automatic Dip Seal and Improved Retort Lids. Will give personal attention to the prompt execution of all orders. Address 60 Vesey Street, New York. 301

JOURNAL OF THE FRANKLIN INSTITUTE.

EDITOR—PROF. W. H. WAHL, PH.D.

ASSISTED BY THE COMMITTEE ON PUBLICATIONS.

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The Journal is now in its forty-fifth year of publication, and has become a standard work of reference.

TERMS OF SUBSCRIPTION.—Five dollars per annum; payable on the issue of the sixth number. When the full subscription (five dollars) is paid in advance, the numbers will be sent *free of postage*

Communications and letters on business must be directed to the ACTUARY OF THE FRANKLIN INSTITUTE, PHILADELPHIA

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Continental Works,

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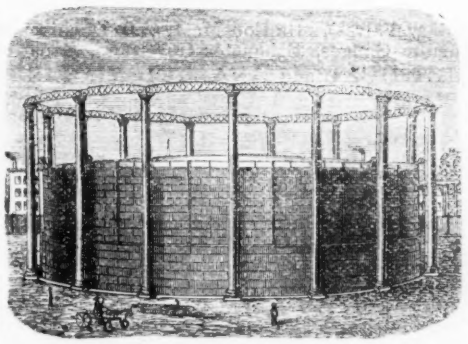

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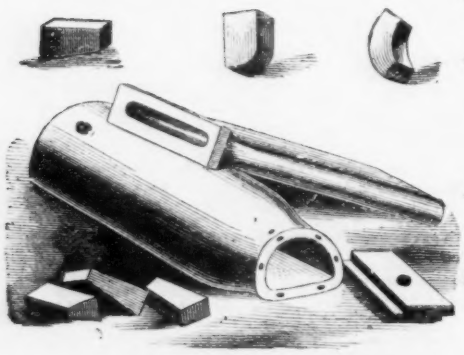

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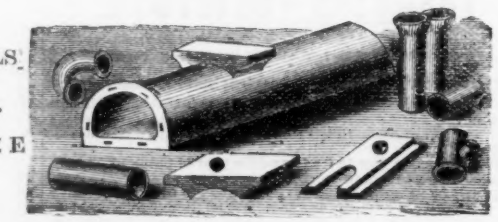

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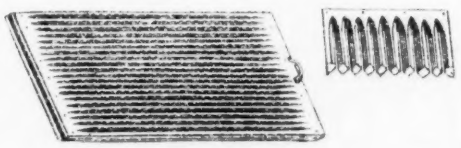

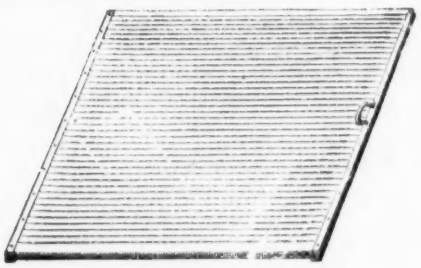

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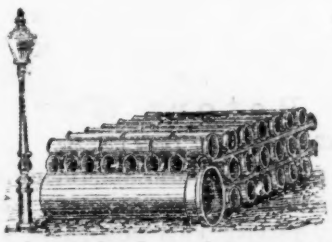

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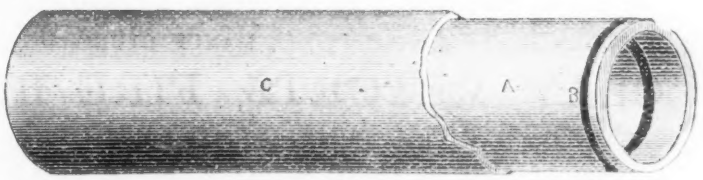

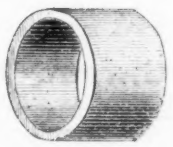

Fig. 2.

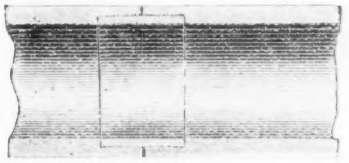

Fig. 3.

A—Cylinder of Wood. B—Band of Iron. C—Coating of Hydraulic or Asphaltum Cement.

Fig. 2.—Thimble for Connection. Fig. 3.—Horizontal Section and Connection.

Above is a cut of the

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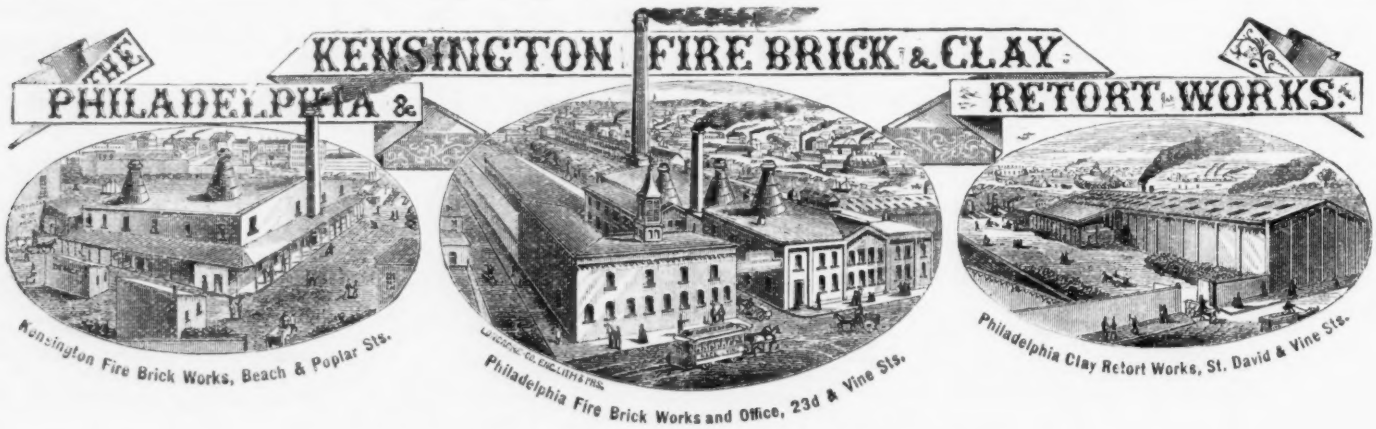
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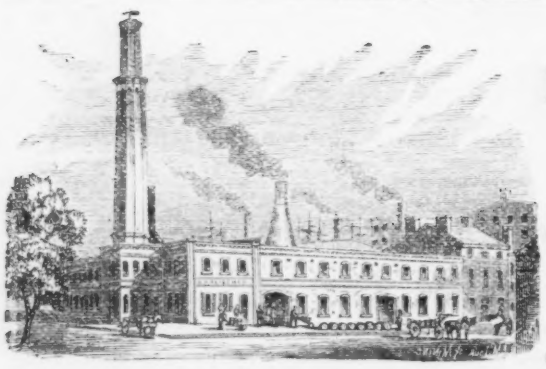

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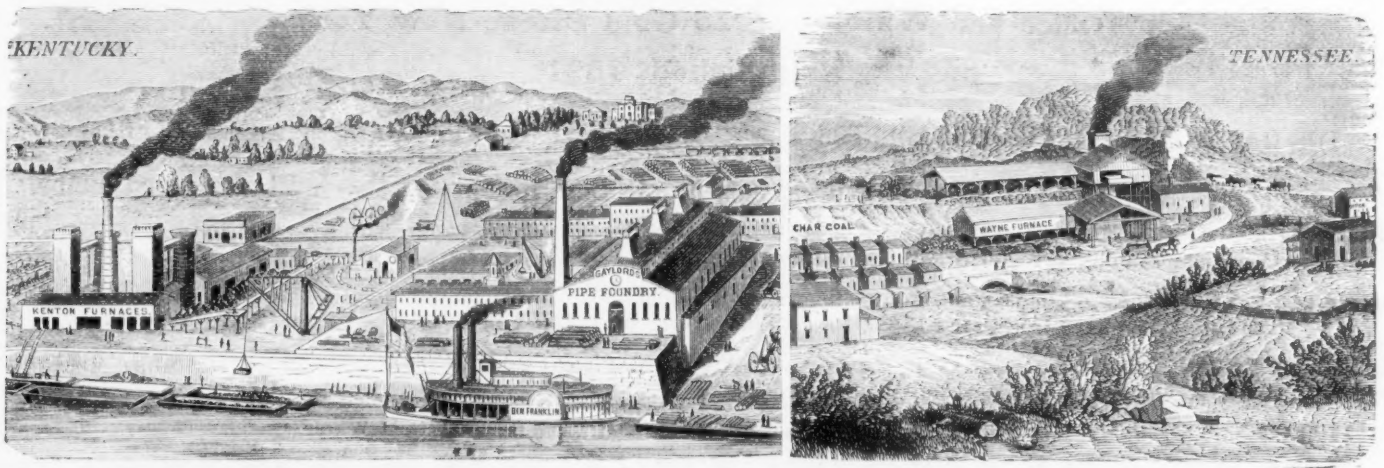

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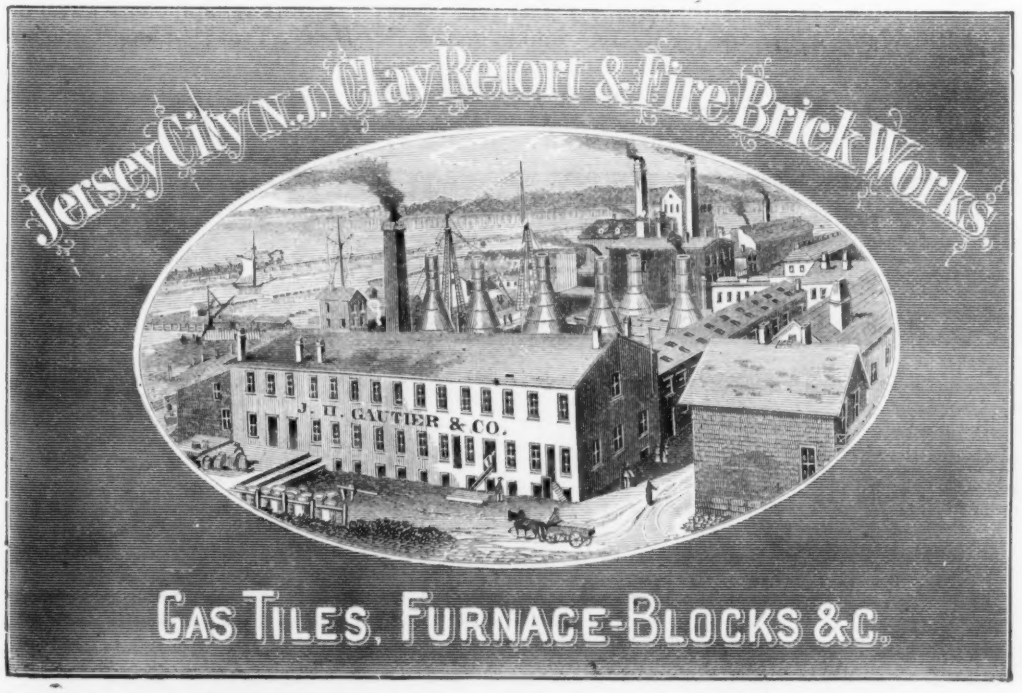

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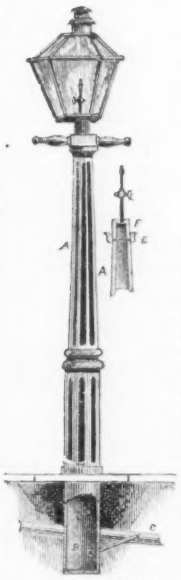

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BENCH CASTINGS.—Retorts, and all Castings and Wrought Iron Work required for Setting them on the Latest Plan. Tar Gates, Wrought Iron Stand Pipes, Retort Lids, Cotter Bars, Coal and Coke Wagons, and Stokers' Tools.

EXHAUSTERS.—Exhausters and Compensators, By-Passes to pass from 4,000 to 150,000 Cubic feet of Gas per hour, with Engines, Governors, Pressure and Vacuum Guages.

SCRUBBERS.—Single or Multitubular Scrubbers, with Self-Acting Pumps for Ammonia Water.

WASHERS.—Cataract and Single and Multitubular Spray Washers

CONDENSERS.—Single and Multitubular Air and Water Condensers.

PURIFIERS.—For Purifying from 1,000 to 2,000,000 cubic feet capacity daily, with either wet or dry Lime, or Oxide of Iron, and with either Ash Rivetted or Wrought or Cast Iron Lime Sieves.

CARRIAGES.—Movable Lifting Carriages for Purifiers, arranged either for Floor or Overhead use.

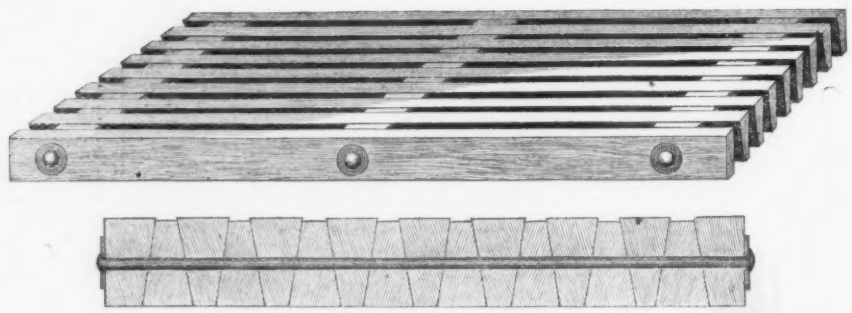
METERS.—Square and Round Meters of any capacity.

GAS HOLDERS.—Single Lift and Telescopic Gasholders, with Cast or Wrought Iron Suspension Frames.

GAS GOVERNORS.—Station Governors, with Regulating and Indicating Columns for Inlet and Outlet Pipes, also Dry Governors with Flexible Diaphragms for Underground Pipes.

STOP VALVES.—Double Faced Stop Valves for Gas or Water, from three inches to forty-eight inches diameter. These Valves are proved on both sides, with a heavy Water Pressure, Flange and Bell Pipes, Fittings and Drips of all descriptions. Steam Boilers and Hot Water Apparatus for Heating Building, and Gas Holder Tanks. Lamp Posts and Lanterns.

P. Munzinger's Patent Ash Lime Trays.



In use at the following Gas-Light Companies:

Pittsburg Gas Company, Pa.
Peoples Gas Company, Baltimore.
Lowell Gas-Light Company, Mass.
Lynn Gas-Light Company, Mass.
Albany Gas-Light Company, N. Y.
Schenectady Gas Light Company, N. Y.
Utica Gas-Light Comwany, N. Y.
Jersey City Gas Company, N. J.
St. Paul Gas-Light Company, Minn.
Cumberland Gas-Light Company, Md.
Hartford City Gas-Light Company, Conn.
Richmond Gas Company, Va.
McKeesport Gas Company, Pa.
Middletown Gas Company, Pa.
East Newark Gas-Light Company, N. J.
Binghampton Gas Company, N. J.
Zanesville Gas Company, Ohio.

New Orleans Gas Company, La.
Salem Gas-Light Company, Mass.
New Britain Gas Light Company, Conn.
Rahway Gas-Light Company, N. J.
Trenton Gas-Light Company, N. J.
Elmira Gas Company, New York.
Erie Gas Company, Pa.
Columbus Gas-Light Company, Ohio,
Westchester Gas-Light Company, N. Y.
Santa Cruz Gas Company, Cal.
Lawrence Gas-Light Company, Kansas.
Salem Gas Company, N. J.
Indiana Gas-Light Company, Pa.
Peoria Gas Company, Ill.
Montclair Gas Company, N. J.
Williamsport Gas Company, Pa.
Wooster Gas-Light Company, Ohio.

Augusta Gas-Light Company, Ga.
Huntsville Gas Company, Ga.
Chattanooga Gas Company Tenn.
Murfreesboro Gas Company, Tenn.
Hagerstown Gas-Light Company, Md.
Hanover Gas Company, Pa.
Easton Gas Company, Pa.
Uniontown Gas-Light Company, Pa.
Coatesville Gas-Light Company, Pa.
Houston, Gas Company, Texas.
Wilkesbarre Gas Company, La.
Middletown Gas Company, New York.
Washington Gas-Light Company, Pa.
Princeton Gas-Light Company, N. J.
Newark Gas Company, Ohio.
Pontiac Gas-Light Company, Mich.
And numerous other Companies.